

THE TROPICAL AMERICAN GENUS *TACHIGALIA* AUBL.
(CAESALPINIACEAE)*

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As in most caesalpiniceous genera with a center of distribution in the Amazon, one can divide the taxonomic history of *Tachigalia* into two broad periods: the first dominated by the classical works of such authors as Tulasne and Bentham, the second by the brilliant studies of Harms, Ducke, and other recent authors. Of the 22 species of *Tachigalia* recognized in this paper, Ducke has described six. Only one, *T. alba* Ducke, has been reduced to the status of a variety.

Throughout the history of *Tachigalia* most workers have readily linked it to *Sclerolobium*, a strictly tropical American genus with a center of distribution in the Amazon. Paradoxically, Bentham¹ segregated the two genera, placing *Tachigalia* in the Tribe *Amberstieae* and *Sclerolobium* as the type genus of the *Sclerolobieae*. He challenged Tulasne's remark as to the "grande affinité" between the two genera, stating that *Tachigalia* "a quo tamen meo iudicio essentialiter differt floribus obliquis et stipite ovarii calycis tubo uno adnato v. saltem supra basin affixo." In my opinion there is no basis for Bentham's segregation. The vast Tribe *Amberstieae*, with more than 65 genera distributed throughout the warmer climates of the world, exhibits an extraordinary meshwork of generic lines. Certainly the central position of the stipe of the ovary is not a character of sufficient strength to warrant the exclusion of *Sclerolobium* from the tribe. In fact, the fruiting material of the two is so similar morphologically that at times it is impossible to tell them apart. Floristically, the principal differences between the two genera lie in the attachment of the stipe of the pistil, in the character of the pubescence of the perianth parts, and in the pattern of the inflorescence. One species, *T. formicarum* Harms, is not readily separated from *Sclerolobium* and may well prove a strong enough link between the two genera to warrant challenging their segregation.

I feel that my work stresses the structure of the flower more than has been attempted in the past. Four floral characters are of great significance in *Tachigalia*: (1) the shape of the receptacle-cup; (2) the shape, and, to some degree, the pubescence of the filaments of the stamens; (3) the pubescence of the petals; and (4) the general character of the stipe of the pistil. In the descriptions of many authors the great variability of the vegetative structures has been disregarded, e.g. the variation in the number of leaflets, the character of the pubescences of the leaves, the number of stipule segments, and the myrmecodomatia of the petioles.

In my formal descriptions of the species of *Tachigalia* I refer constantly to the "lax paniculate inflorescence" and to the "receptacle-cup as seen in hemisection." These terms may require clarification.

¹Bentham, George. *Caesalpineae*. In Mart. Fl. Bras. 15²:41-254. 1876.

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Actually the term "paniculate inflorescence" is used for convenience, inasmuch as the flowering mass gives the general "impression" of a panicle. On closer examination, however, it is evident that most of the lateral branches arise individually from the axils of the leaves and in reality are racemes. However, in pluriramose inflorescences in which the uppermost leaves are deciduous, the fundamental arrangement of the flowers is so obscured that it is well to adhere to the traditional description of it as a panicle.

I have given considerable emphasis to the morphology of the receptacle-cup and to the stipe of the pistil.² In describing the receptacle I refer constantly to a "hemisection" of the cup. A hemisection is best made by taking a scalpel with a broad and thin blade and laying it flat against the upper half of the flat side of the ovary (the sepals, petals, and stamens having been removed under a dissecting microscope); the blade is then pushed through the wall of the cup; the latter may be coriaceous and resistant. Inasmuch as the receptacle-cup varies from being very inequilateral to subequilateral (cf. fig. 1), we may measure a short side and a long side, using the apex of the pedicel as a point of reference. The measurements are made on the part of the cup retaining the stipe of the pistil.

MYRMECOPHILY

The name and much of the fame of *Tachigalia* rest to some degree on the fact that many of the species have the foliage and the inflorescence partly altered by the work of insects (ants, beetles, and coccids). As Bailey³ points out, "*T. paniculata* Aubl. (type species) was described in 1775 by Aublet, who derived the generic name from "tachigali", a word used by the Indians of the Guianas in referring to trees inhabited by stinging ants, "tachi", of the genus *Pseudomyrma*.⁴

While it is not within the province of this paper to take up the fascinating topic of myrmecophily, nevertheless it is necessary to present certain points relating to it. Myrmecophily is not unusual in the families of flowering plants. In the *Caesalpinaceae* it occurs in only three strictly New World genera: *Tachigalia*, *Sclerolobium* Vog. and *Platymiscium* Vog. Two species of *Sclerolobium*, *S. physophorum* Huber and *S. odoratissimum* Spruce ex Benth., are known to be myrmecophilous.⁵ The fact that this condition is common in these two genera in the New World suggests a close kinship.

Myrmecophily is by no means universal in the genus *Tachigalia*. In more than 114 collections examined only 36 showed evidence of myrmecodomatia. The most

²At least one contemporary student of the African genera of the Tribe *Amberstieae*, J. Léonard (Bull. Jard. Bot. Brux. 21:376. 1951) is devoting considerable attention to this structure. *Tachigalia* appears to be closely related to his African genus *Lebrunniodendron*.

³Bailey, I. W. Notes on neotropical ant-plants. II. *Tachigalia paniculata* Aubl. Bot. Gaz. 75:27-41. 1922.

⁴No doubt the presence of stinging ants on the tachigalia trees accounts for the relative paucity of collections made.

⁵Recently I found several sheets of a collection of Krukoff (8898, F, MO, US) which I have identified as *S. odoratissimum*. It is from São Paulo de Olivença, basin of creek, Belém, Amazonas, Brazil. It is apparently the second collection of the species, the type having been collected by Spruce at Rio Negro, Cucuí, Amazonas, Brazil.

striking instance of the absence of myrmecodomatia is in the well-collected species, *T. pubiflora* Benth. The works of Bailey⁶ and Bequaert⁷ provide us with the bulk of data on myrmecophily in plants, although only one species of *Tachigalia* was studied, *T. paniculata*.

Apparently in the immature leaves the initial swelling at the base of the petiole is not induced by insect action but is a "normal hypertrophy" of the leaf-base. This is the first step in a normal process culminating in the establishment of "hollow petioles and rachises of adult sun plants." This natural hollowing-out process, independent of insect work, results in a petiole which may support the heavy pairs of leaflets of the adult plant. However, the usual fate of the normal hypertrophies of the juvenile petioles of seedlings growing in shade is to be attacked by two species of ants.⁸ Whether this attack is responsible for the petiole and the rachis of the inflorescences being so radically altered in such species as *T. formicarum*, *T. rusbyi*, and *T. cavipes* is not known. It would seem logical, however, to consider this condition to be due in part to the work of insects.

From a taxonomic viewpoint Bailey's studies on the single species *T. paniculata* may serve to suggest the possible sequence of steps involved in the maturation of the leaves of all of the tachigalias. In the juvenile plants of *T. paniculata* growing in shade the petioles show a distinct basal enlargement (the potential myrmecodomatium) while in older plants exposed leaves show a more fasciated character (cf. loc. cit., fig. 1). According to Bailey, the young leaves are widely separated under weak light; when the saplings grow in exposed light the leaves change to a yellow or red-brown and "become thick, coriaceous, closely crowded, pendant, and conspicuously embossed-reticulate on the upper surface when dry, and the large foliaceous stipules are palmately multifid."

I have observed that there is a correlation between the pubescence of the leaflets of most tachigalias and the degree of coriaceousness of their texture; i.e. the thicker leaflets tend to be only pubescent to subglabrous while the thinner blades as a rule are densely pubescent. Inasmuch as Bailey's findings on *T. paniculata* indicate the role of environmental factors in the thickness of the leaflets, I feel that the character of the pubescence is difficult to interpret in the absence of mass collections of the species. I have attempted in my study to employ it with moderation as a critical character (cf. my key). It apparently is of especial significance in such species as *T. pubiflora*, *T. myrmecophila*, *T. venusta*, and *T. rigida* where the pubescence of

⁶Bot. Gaz. 75:27-41. 1922; The anatomy of certain plants from the Belgian Congo, with special reference to myrmecophytism. In Wheeler, W. M. Ants of the Belgian Congo. Amer. Mus. Nat. Hist. Bull. 45:585-621. pls. 30-45. 1921-1922.

⁷Bequaert, J. Ants in their relation to the plant world. In Wheeler, W. M. Ants of the Belgian Congo. Amer. Mus. Nat. Hist. Bull. 45:333-583. pls. 26-29. 1921-1922.

⁸Bailey (Bot. Gaz. 75:33) states that he and Wheeler "found more than 30 different species of ants in the inflated petioles of juvenile plants. Seven of these are definitely attached to *Tachigalia* as their host plants, and may be designated as 'obligatory', whereas most of the others are facultative, i.e. inquiline which take possession of old domatia that have been abandoned by previous tenants." Both the beetles and ants use "the hollow foliar axes as . . . nesting chambers . . . The beetles eat the parenchyma of the medullary rays and obtain liquid carbohydrates from herds of coccids which graze upon it."

the leaflets seems to persist. It must be admitted, however, that all of these species with the exception of *T. pubiflora* are known only from a few collections.

The following statement of Bailey's should serve as a warning to those attempting to identify *Tachigalia* and perhaps many genera of the Caesalpinaceae: "In fact, the vegetative characters of dominant trees are so unlike those of young suppressed individuals that it is difficult to realize that the two types of plants actually belong to a single species." In my opinion this is substantial reason, in light of the paucity of material in *Tachigalia*, for using vegetative characters very judiciously. Considering that the fruits of the tachigalias are so poorly known, one can readily understand the importance of floral characters.⁹

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Arnold Arboretum, Jamaica Plain, Mass. (A).

Chicago Natural History Museum, Chicago, Ill. (F).

Missouri Botanical Garden, St. Louis, Mo. (MO).

New York Botanical Garden, New York, N. Y. (NY).

Jardin des Plantes, Muséum National d'Histoire Naturelle, Paris (P).

U. S. National Herbarium, Washington, D. C. (US).

TAXONOMY

TACHIGALIA Aubl. Hist. Pl. Guin. 1:372. 1775.

Cuba Scop. Introd. 300. 1777.

Valentina Neck. Elem. 2:450. 1790.

Tachia Pers. Syn. Pl. 1:459. 1805.

Tassia Rich. ex D.C. Prodr. 2:487. 1825.

Small or large trees; stipules paired, segmented, the laminae foliose; leaflets 3- to 15-jugate, pairs opposite (occasionally alternate in *T. multijuga*), the upper pairs usually larger than the basal pair; leaflets chartaceous to coriaceous, usually inequilateral, the costa prominent beneath, the secondary veins (1-) 2-20 per side, arcuate-ascending, acuminate at apex, obtuse, cuneate, auriculate or cordate at base, the margin slender-callose, often subrevolute, rarely bullate (?); petioles often myrmecophilous at base or rarely along entire length, angular (often subtriangular) to biconvex in cross-section, nodose at petiolule attachment; petiolules short; in-

⁹It is remarkable that very few collections bear legumes of any appreciable size; in fact the fruits of only 6 of the 22 species have been described. In my opinion, the mature fruit of the tachigalias is probably dehiscent, despite several descriptions to the contrary. One collection of *T. venusta*, Capucho 418 (F), has an excellent dehiscent fruit.

florescence "lax-paniculate," the central rachis occasionally myrmecophilous, the flowers disposed in dense racemes; bracteoles of mature flowers soon deciduous, subulate, pubescent; receptacle-cup campanulate, urceolate, cylindrical, or subtriangular, the sides as seen in hemisection subequal to obviously unequal, pubescent on outside, glabrous and often furfuraceous (ant eggs?) within; sepals 5, imbricate, reflexed at anthesis, pubescent, the 2 outermost smaller and thicker, the margin ciliolate to ciliate; petals 5, yellow to white, rarely orange in vivo, subequal, petaloid to carnose, often subclawed at base; stamens 10 (rarely 15-16), unequal in length, the filaments uniform, or 7 obviously longer, more slender and subulate, the other 3 often conspicuously reduced, more falcate or sigmoidal, and thicker in middle, the entire complement of filaments pubescent at base on inside (in one species one filament glabrous in toto), often pubescent at base on outside, the anthers glabrous, versatile, dehiscing longitudinally; stipe of pistil never with strict central attachment, the ovary narrow-oblong, densely pubescent throughout, the ovules 4-15, the style elongate, scattered pubescent below, the stigma capitate, rarely bifid; fruit short-stipitate, oblong, flat, thin, the coriaceous valves apparently completely separating at maturity, the seed solitary, surrounded by a subligneous and thin wing as broad as the valves.

Nomenclatural type: *Tachigalia paniculata* Aubl.

KEY TO THE SPECIES

- a. Filaments of all stamens pubescent at base; pubescence of ovary uniformly distributed; South America.
- b. Principal secondary veins of leaflets 5-20.
- c. Stamens 10 (-11).
- d. Leaflets essentially glabrous; receptacle-cup elongate-turbinate or cylindrical, tapering on wider side, about $10 \pm$ mm. long, the hairs dense, subappressed; staminal filaments 1.5-2.2 mm. wide.
- e. Leaflets 4- to 8-jugate, the costa prominent on upper side.....1. *T. longiflora*
- ee. Leaflets 3-jugate, the costa almost plane on upper side.....2. *T. catinae*
- dd. Leaflets pubescent (often microscopically); receptacle-cup irregularly urceolate, campanulate, or caliciform, up to 8 mm. long; petals white to yellow in vivo, densely to sparsely pubescent within, rarely ferruginous; staminal filaments up to 1.5 mm. wide.
- e. Leaflets 8- to 13-jugate3. *T. multijuga*
- ee. Leaflets 2- to 7-jugate.
- f. Leaflets with secondary veins immersed above, margins obviously revolute; inflorescence completely ferruginous to velutinous; margins of sepals densely ciliate4. *T. rigida*
- ff. Leaflets with secondary veins plane to prominulous above, margins scarcely revolute; inflorescence at most moderately velutinous; margins of sepals ciliolate.
- g. Leaflets glabrous above (except the costa), subequilateral; bracteoles equal to or exceeding the mature buds.....5. *T. bracteolata*
- gg. Leaflets sericeous, often velutinous beneath, obviously inequilateral; bracteoles not exceeding the mature buds, usually fugacious.
- h. Longer side of receptacle-cup as seen in hemisection (4-)5-9 mm. long.
- i. Wall of receptacle-cup 0.2-0.9(-1) mm. thick.
- j. Leaflets (2-)4- to 7-jugate, the costa prominulous to plane above.
- k. Mature leaflets densely sericeous below and (usually) above.
- l. Leaflets tapering subacutely at base; rachis of inflorescence swollen (3.5-5 mm. wide at base)6. *T. cavipes* ✓
- ll. Leaflets tapering sharply, or very obtuse to subauriculate at base; rachis of inflorescence 1-3 mm. wide at base.

- m. Petioles with myrmecodomatia; juvenile and mature leaflets sericeous and velutinous on both sides, the principal secondary veins usually 6, arcuate; stipe of ovary basal and suberect in a short urceolate cup with subequal sides; fruit up to 15 cm. long; Brazil.....7. *T. venusta*
- mm. Petioles without myrmecodomatia; juvenile leaflets sericeous beneath, the older ones often sparsely puberulent beneath, the principal secondary veins 8-12; stipe of ovary curving arcuately, arising 1.5-2 mm. above base of an obviously inequilateral cup; fruit up to 11 cm. long; British Guiana.....8. *T. pubiflora*
- kk. Mature leaflets merely puberulent beneath.....9. *T. paniculata* ✓
- jj. Leaflets 2- to 4-jugate, the costa prominent above.....10. *T. ulei*
- ii. Wall of receptacle-cup 0.8-1.4 mm. thick; basal hairs of thicker staminal filaments scattered11. *T. plumbea*
- hh. Longer side of receptacle-cup as seen in hemisection 1-4(-5) mm. long.
- i. Stipules about 6 cm. long.....12. *T. grandistipulata*
- ii. Stipules 1.5-4 cm. long.
- j. Leaflets 2- to 4-jugate, densely sericeo-puberulent at maturity.....13. *T. myrmecophila*
- jj. Leaflets 4- to 12-jugate, moderately puberulent to subglabrous.
- k. Petioles and branches swollen; sides of receptacle-cup as seen in hemisection almost equal; petals not exceeding largest sepals in length, the long hairs extending beyond margins.....14. *T. formicarum* ✓
- kk. Petioles and branches not greatly swollen; sides of receptacle-cup as seen in hemisection obviously unequal; petals exceeding largest sepals in length, with hairs not projecting beyond margins.
- l. Leaflets 7- to 12-jugate; receptacle-cup inequilaterally subrotund15. *T. polyphylla* ✓
- ll. Leaflets 6- to 10- (rarely 12-) jugate; receptacle-cup inequilaterally caliciform.
- m. Leaflets chartaceous16. *T. agyrophylla*
- mm. Leaflets coriaceous.
- n. Filaments of stamens dimorphic, 5-10 mm. long; stipe of pistil 2(-3)-7 mm. long.
- o. Bracteoles narrow at base, 4-6 mm. long; stipe of pistil up to 3 mm. long.....17. *T. rusbyi*
- oo. Bracteoles swollen at base, up to 2 mm. long; stipe of pistil (3-)4-8 mm. long.....18. *T. pulchra*
- nn. Filaments of stamens submonomorphic, 5-6.5 mm. long; stipe of pistil up to 1.5 mm. long19. *T. tessmannii* ✓
- cc. Stamens 15 (-19)20. *T. macrostachya*
- bb. Principal secondary veins of leaflets 1-3.....21. *T. ptychophysca*
- aa. Filaments of stamens pubescent at base, except one filament entirely glabrous; hairs of ovary disposed in longitudinal rows; Costa Rica.....22. *T. versicolor*

1. TACHIGALIA LONGIFLORA Ducke, in Arch. Inst. Biol. Veg. 2:38-39. 1935. (*T.*: Ducke 24291!).

Small trees; ultimate twigs smooth, waxy on surface, drying purple-black, glabrous; stipules not seen; leaves up to 0.5 m. long; petioles triangular in cross-section below, about 0.5 cm. wide, up to 40 cm. long, plano-convex toward apex (about 0.4 mm. wide), drying purple-black; petiolules smooth, glabrous, tumescent, somewhat flattened on one side, up to 5 mm. long, more than half as broad; leaflets 4- to 8-jugate, stiff, coriaceous, glabrous, subequilateral, obovate-oblong or lanceolate, up to 18 cm. long, up to 6.5 cm. wide, acuminate at apex, acute, obtuse and distinctly inequilateral at base, the costa prominent above and below, almost plane beneath proximally, about 2 mm. wide at base, the principal secondary veins 7-8, arcuate-ascending, those in middle of blade 2-3 cm. apart, prominent, the

reticulations lax, prominulous, the margin scarcely revolute; inflorescence lax-paniculate, the branches few, shorter than the leaves, densely tomentose, widely arcuate-ascending; bracteoles densely tomentose, cuneate-subulate, about 5 mm. long, very acute, subplane below tip; buds falcate-oblong, up to 1.6 cm. long, the pedicels about 2 mm. long; receptacle-cup long-turbinate, very coriaceous, the wall about 1 mm. thick, pubescent on outside, the two sides as seen in hemisection about 9 mm. long; sepals 5, carnose-subcoriaceous, finely velutinous on both sides, ovate-oblong to oblong-subrotund, 8–11 mm. long, 6–8 mm. wide, obtuse at apex, the margin ciliolate with minute black glandular bodies amid the ciliolations, the latter often interspersed with more appressed coarse hairs within; petals orange-yellow in vivo, carnose-subcoriaceous, subpellucid, long appressed-hirsute within, concave, linear-oblong to oblong, 10–12 mm. long, 5–7 mm. wide, obviously obtuse at apex, distinctly clawed for 3 mm. at base (or the largest non-clawed and subcordate at base); stamens 10, the filaments of 7 linear-subulate, 18–22 mm. long, bearded only at base within, the other 3 thick-falcate, as wide as or wider at middle as/than at base (1.7–2.2 mm. wide in middle), entirely glabrous or with a few scattered hairs at the base; stipe of ovary slender, pubescent, about 4 mm. long, arising less than a mm. above very base of receptacle-cup, suberect, the ovary linear-rectangular, up to 8 mm. long, the style elongate, up to 14 mm. long; fruit unknown.

BRAZIL: AMAZONAS: São Paulo de Olivença, Rio Solimoes, *Ducke 24291* (F, P).

T. longiflora, known from this solitary collection, is a sharply defined species; it is readily linked with *T. catingae* Ducke. The foliage of both species is essentially glabrous. Both possess a receptacle-cup turbinate in shape and tapering gradually on the wider side. The long dense ferruginous hairs on the inner surface of the petals are strikingly different from those of any other species. The orange petals of the living flowers readily segregate *T. longiflora* and *T. catingae* from other species of *Tachigalia*.¹⁰

2. TACHIGALIA CATINGAE Ducke, in Arch. Inst. Biol. Veg. 4:12–13. 1938. (T.: *Ducke 35421!*).

Low tree; terminal twigs rotund in cross-section, smooth, minutely pubescent; stipules foliose, with two large plane subequal segments, ovate-triangular, up to 2.2 cm. long, acute, the inner one often with a shorter subulate segment at base; leaves up to 30 cm. long; petiole angular in cross-section, obviously canaliculate, glabrous, about 3 mm. wide at base, myrmecodomatium tumescent, about 2 cm. above point of articulation, elliptic-oblong, about 4 cm. long, about 0.8 cm. wide; petiolules subtumescent, glabrous, about 8 mm. long, 4 mm. wide; leaflets of 3 opposite pairs, coriaceous, drying dull tan above and below, glabrous throughout, subequilateral, wide-oblong, about twice as long as broad, up to 20 cm. long, up to 10 cm. wide, long-acuminate (acumen up to 2 cm. long), ultimately obtuse at

¹⁰One collection of *T. pubiflora* made by Abraham in British Guiana states on the label that the flowers are orange to cream-colored.

apex, obtuse and obviously inequilateral at base, the costa subplane, glabrous above, subprominent to prominent and glabrous beneath, up to 2.5 mm. wide at base in largest leaflets, the principal secondary veins $6 \pm$, distinctly arcuate-ascending, prominulous to scarcely evident above, more evident beneath, the reticulations ultimately very small and as evident as secondary veins above, conspicuous beneath, the margin thin-callose, somewhat revolute; inflorescence widely lax-paniculate, rotund in outline, the central rachis ferruginous, subangular and articulate toward apex, up to 14 cm. long, the branches gracefully and widely arcuate-ascending, about same length as central rachis; bracteoles small, subulate, concave, pubescent, up to 3 mm. long; flowers subsessile, the buds inequilaterally obovate, about 8 mm. long; sepals 5, ferruginous-puberulent, 2 of these thicker, concave, oblong to oblong-rotund, 6 mm. long, the others 7.5–1 cm. long, 0.8 cm. wide, obtuse, the margin ciliolate with minute glandular excrescences interspersed; petals orange-yellow in vivo, thin-carnose, concave, appressed-sericeous within, pubescent on outside, with small glandular bodies about 0.2 cm. long on inner side at base, oblong to oblong-rotund, up to 1 cm. long, 6 mm. wide, ciliolate on margin; stamens 10, 7 filaments subulate above middle, up to 14 mm. long, about 0.7–0.9 mm. wide at base, 0.5 mm. wide at middle, densely hirsute at base on inside, the remaining 3 filaments scarcely tapering except at very tip, about 1.5 mm. wide at base, the anthers of 7 filaments about 2 mm. long, those of 3 filaments about 1.2 mm. long; receptacle-cup inequilaterally cylindrical, tapering only gradually at base, the wall coriaceous, about 0.7 mm. thick as seen in hemisection, the longer side about 10 mm. long and shorter side about 7.5 mm. long; stipe of pistil elongate, upright, pubescent, attached about 1 mm. above center of receptacle-cup, about 5 mm. long, about 0.7 mm. wide, the ovary ferruginous-sericeous, elongate-rectangular, about 7 mm. long, about 0.2 mm. wide, the style about 1 cm. long, scattered-villose for about two-thirds its length.

BRAZIL: AMAZONAS: Upper Rio Curicuriary, Rio Negro, *Ducke 35421* (P, US).

This species is readily recognized by its very large leaves (the widest observed in any species of the genus), with leaflets few-jugate and essentially glabrous. According to Ducke, it is a common tree of the well-known *catingas* of the Rio Negro.

3. TACHIGALIA MULTIJUGA Benth. in Mart. Fl. Bras. 15²:230. 1876.

Large tree; terminal twigs smooth, round in cross-section, densely puberulent, longitudinally canaliculate; leaves up to 40 cm. long; stipules not seen; petioles up to 25 cm. long, subrotund to angular or squarrose in cross-section, ultimately virgate, 0.2–0.25 cm. wide at base, villose with erect but apically flexed hairs; petiolules almost smooth, pubescent, squarrose in cross-section, up to 5 mm. long, 1–1.5 mm. wide; leaflets 8- to 13-jugate, thin-coriaceous, pubescent to glabrous above, pubescent to subglabrous below, usually drying chocolate-brown beneath, oblong to narrow-oblong, up to 11 cm. long, up to 3.2 cm. wide, those at middle of leaf often larger than terminal or subterminal ones, distinctly acuminate (the

acumination ultimately acute), inequilateral and obtuse at base, the costa subimmersed above, prominent beneath, often pubescent only at base, about 0.3–0.4 mm. at middle of lamina, the principal secondary veins 6–10, prominulous above, prominulous to prominent beneath; inflorescence lax-paniculate, the central rachis up to 25 cm. long, about 0.35 cm. wide at base, densely pubescent, the branches lax-arcuate or often sharply divergent, up to 18 cm. long, the racemes narrow-pyramidal; bracteoles densely pubescent (often ferruginous), subulate, up to about 11 mm. long, acute; buds narrowly obovate or widely obpyriform, up to 1.5 cm. long; receptacle-cup cylindrical or cup-shaped, often ferruginous on outside, the wall carnose, 0.4–0.8 mm. thick, the longer side as seen in hemisection (5–) 7–10 mm. long, the shorter side (4–) 5–7 mm. long; sepals 5, 2 smaller, all stiff-carnose or subcoriaceous, velutinous or ferruginous-pubescent on inside and outside, oblong, ovate-oblong to subrotund, 4.5–9 (–12) mm. long, 3.5–7 mm. wide, acute or obtuse at apex, the margin densely ciliolate; petals yellow in vivo, appressed-hirsute within, usually glabrous on outside (occasional flaring hairs at base), oblong to obovate-oblong, 6.5–7 mm. long, 4.5–5 mm. wide, obtuse at apex, somewhat clawed to obviously clawed at base; stamens 10, the filaments of 3 shorter or more widely subulate (0.6–1.2 mm. wide in middle), all 7–10 mm. long, about 1 mm. wide at very base, the hairs restricted to lowest quadrant on inside, the 7 remaining filaments more narrow-subulate, up to 1.4 mm. wide in middle, the anthers about 2.2 mm. long; stipe of pistil attached about 1 mm. above center of base of cup, suberect, $6 \pm$ mm. long, the ovary velutinous, oblong, 4–6 mm. long, 2–2.5 mm. wide in middle, the style $12 \pm$ mm. long; fruit (here apparently immature), coriaceous, oblong, up to 9 cm. long, 3 cm. wide, very obtuse at apex, subcuneate at base.

BRAZIL: Without locality, *Lund s. n.* (P); *Glaziou 2996* (P); AMAZONAS: Capoeiras near Uananuca, Rio Negro, *Spruce 2022* (P); SÃO PAULO: Santos, *Mosén 3370* (P); RIO DE JANEIRO: Serra dos Orgaos, *Glaziou 11909* (P); banks of Tijuca, *Riedel & Luschnatt 1253* (A, NY); Tijuca, *Riedel & Luschnatt s. n.* (NY).

Only two species of *Tachigalia* have numerous leaflets: *T. multijuga* and *T. polyphylla*. These are readily distinguished, the former having very large buds and flowers, the latter having much smaller ones.

One of the two sheets labelled *Spruce 2022* in the Paris Herbarium shows a specimen in bud and with obviously immature leaflets. The buds are densely ferruginous-pubescent and are subtended by persistent (?) subulate, ferruginous stipules. The leaflets are slightly puberulent above and densely so beneath. I consider this to be *T. multijuga* despite the fact that it does not match, at least with respect to the maturity of its parts, Bentham's original description.

The second sheet, bearing no indication of locality, has foliage fragments of 2 species; one of the leaves is obviously *T. ptychophysca*; the other leaf is, in my opinion, obviously not *Tachigalia*.

There is a beautiful plate (pl. 59) of *T. multijuga* in 'Flora Brasiliensis' (loc. cit.).

4. *TACHIGALIA RIGIDA* Ducke, in Arch. Inst. Biol. Veg. Rio de Janeiro 4:12. 1938. (T.: *Ducke 35423!*).

Small trees; ultimate twiglets canaliculate, finely velutinous; stipules not seen; leaves up to 25 cm. long; petioles slender, velutinous, scarcely nodose at petiolule-articulation, with inconspicuous myrmecodomatia 2–2.5 cm. from base, 2.5–3.5 cm. long, 0.5–0.7 cm. wide; petiolules of largest leaflets up to 7 mm. long, about 3 mm. wide, densely velutinous; leaflets 4- to 6-jugate (the lower pairs smaller, 1.5–2.5 cm. apart), subequilateral, subcoriaceous, stiff, drying dull gray-green above, tan beneath when immature, densely velutinous above and below, the hairs often cinnamomeous below, the older leaflets subglabrous above (except costa), narrow-lanceolate to narrowly subovate-lanceolate, up to 12.5 cm. long, up to 3.3 cm. wide, distinctly acuminate (the acumen up to 1 cm. long) at apex, ultimately acute, subcuneate to cuneate-obtuse at base, the costa immersed above and densely tufted-pubescent, very obviously prominent beneath and densely pubescent, about 2 mm. wide proximally, the principal secondary veins 8 to 10, arcuate-ascending, immersed above, prominent beneath, the tertiary veins conspicuous above and below, the ultimate reticulations evanescent, the margin revolute; inflorescence lax-paniculate, the central rachis up to 30 cm. long, up to 0.4 cm. wide at base, velutinous, the pedicel-scars whorled, conspicuous below, the lateral branches few, often exceeding the main axis, the terminal racemes 8–11 cm. long; bracteoles concave, densely pubescent, upright, subulate, swollen at base, up to 6 mm. long; buds at maturity obliquely obovate-rotund; receptacle-cup (including pedicel) caliciform, the wall coriaceous, about 0.8 mm. thick, pubescent on outside, glabrous within, the longer side as seen in hemisection about 9 mm. long, the shorter side about 4 mm. long; sepals 5, 2 obviously smaller, all thin-coriaceous, densely pubescent, the hairs dense, scraggly but subappressed and ferruginous, oblong, obovate-oblong to subrotund, 8–9 mm. long, 6–7 mm. wide, obtuse at apex and base, the margin densely ciliate; petals 5, yellow in vivo, subequal, thin-carnose, subpellucid, pubescent within and at very base on outside, the subappressed hairs restricted medianly, oblong to oblong-rotund, 8–10 mm. long, 7–8 mm. wide, obtuse at apex, obviously clawed; stamens 10, of which 7 filaments are linear-subulate, up to 20 mm. long, about 0.5 mm. wide in middle, pubescent on both sides at base, the remaining 3 filaments thickly subulate, falcate above, about 8–9 mm. long (without stretching), about 1.1 mm. wide in middle, the hairs dense and irregular below middle, the anthers of the 3 thick filaments about 1.1 mm. long; stipe of pistil often arising just below middle of longer side of cup as seen in hemisection, 3.5–4 mm. long, curving arcuately, the ovary narrow-oblong, about 5 mm. long, 2–2.5 mm. wide, entirely pubescent, the style elongate, the ovules 9–12; fruit not seen.

VENEZUELA: AMAZONAS: Solano, Lower Casiquiare, *Llewelyn Williams 14810* (F, US).

BRAZIL: AMAZONAS: Rio Negro, Cucuhy, Igarapé Macacuny, *Ducke 35423* (P, US).

COLOMBIA: Río Negro, Ríos Guainia & Casiquiare, Cano Ducuruapo (Igarapé Rana), *Schultes & Lopez 9389* (US).

T. rigida is readily recognized by its subequilateral and elliptic leaflets which, when young, have a dense cinnamomeous pubescence on the underside; the pubescence is retained by the mature branches of the inflorescence. The leaflets of both Williams' and Ducke's collections have the secondary veins immersed. This is not encountered in any other species of the genus.

Williams' collection, cited above, makes it clear that the character of the pubescence is variable with the age of the leaflets (cf. remarks in introduction to this paper); the more mature leaflets are subglabrous above. I noted in dissecting the flowers that the stipe of the pistil is attached closer to the base than it is in the other two collections cited. Williams' field notes on his collection 14810 are interesting.¹¹ The locality indicated on the typewritten label does not agree with the one on the printed label of the herbarium sheet. I have not seen Ducke's *T. rigida* var. *argentea* based on his own collection 35422 from Río Curicuriary, Amazonas, Brazil. He remarks: "A typo differt foliolis junioribus utrinque tomento brevior sericeo subargenteo (nec nervis rufopilosis), foliolis vetustis (supra glabratis), subtus unicoloribus subaureis" I suspect that the variety will show considerable variation in the pubescence of leaflets of different ages, thus jeopardizing its validity.

5. *TACHIGALIA bracteolata* Dwyer, sp. nov. (T.: *Martin s. n.*!).

Arbores?; ramuli terminales minute lenticellati puberuli transverse rotundati tenuiter canaliculati; stipulae simplices lineari-spathulatae proxime lineares apice spathulatae, circ. 10 mm. longae, curvatae (certe deciduae maiores); folia ad 30 cm. longa; petioli puberuli virgati, ad 16 cm. longi, in medio 1–1.2 mm. lati, vix nodosi; petioluli graciles puberuli, ad 5 mm. longi; foliola 3- vel 4-jugata, tenuicoriacea, subglabra (praeter costam), vix inaequilateraliter elliptica vel oblonga (rare ovata), ad 14.5 cm. longa, ad 5.2 cm. lata, apice conspicue acuminata gradatim attenuata basi obtusa, costa tenue (ad 0.8 mm. basi lata) puberula supra prominula infra subprominente, venis secundariis principalibus 4–7 arcuato-ascendentibus supra prominulis infra conspicuis essentialiter glabris, reticulatis venis minimis ultime vix distinctis, marginibus tenui-callosis; inflorescentiae paniculatae foliis breviores, rhachide centrale angulare puberulo, ad 8 cm. longo, circ. 2 mm. basi lato, ramulis virgatis puberulis, racemis dense floriferis, ad 6 cm. longis, bracteolis elongatis non mox deciduis, subulatis, ad 11 mm. longis, saepe maturas gemmas multo excedentibus, marginibus plerumque revolutis; calyx receptaculi inaequilateraliter cylindricus plerumque extus costatus, pariete carnosus, 0.5–0.7 mm. lato, latere longiore 6–8 mm. longo, latere brevior 4–5 mm. longo; sepala 5, ex-

¹¹"Canáchi (Baniba). Arbol de tamaño mediano con la corona sobre saliente hacia el río y de forma irregular; tronco 30 cm. ó mas de diam., redondo sin ramas por la mitad de la altura; la corteza aspera gris y el loer castaño claro; las flores amarillas en espigas terminales erectas; la albura de color claro, y el duramen algo mas obscuro no muy bien definido; en la margen arboreada, periodicamente anegada; arriba de Maroa, Río Guainia, alt. 127 m."

teriora 2 crassioria, omnia carnosia vel subcoriacea extus intusque sericea, concavo-oblonga vel oblongo-rotunda, 3.5–7 mm. longa, 3.5–5 mm. lata, marginibus dense ciliolatis; petala carnosia extus glabra intus pubescentia, ciliis longis irregularibus in medio corpore dispositis, oblonga-elliptica vel obovata, 6.5–9 mm. longa, 3.2–4.5 mm. lata, obtusa plerumque basi unguiculata; stamina 10, filamentis 7 lineari-subulatis, ad 15 (?) mm. longis, circ. 0.4–0.6 mm. latis, in medio multos comos basi ferentibus, filamentis 3 reliquis crassioribus falcatis vel suberectis 5–8 mm. longis, circ. 1 mm. in medio latis; stipes ovarii elongatus, 3–4 mm. longus, ad apicem rectus, ovario oblongo, stylo elongato; fructus non visus.

FRENCH GUIANA: Cayenne, *Martin s. n.* (F).

The new species is marked by thin subchartaceous and subequilateral leaflets, virgate petioles, and elongate and persistent (even following anthesis) bracteoles. It is from the character of the latter that the species derives its name. The bracteoles are remarkably revolute. *T. bracteolata* seems to be closely related to *T. paniculata* Aubl.

6. *TACHIGALIA CAVIPES* (Spruce ex Benth.) Macbr. in Field Mus. Publ. Bot. 13³:127. 1943.

Tachigalia paniculata Aubl. var. *cavipes* Spruce, ex Benth. in Mart. Fl. Bras. 13²:229. 1876.

Large tree; twiglets usually round in cross-section, puberulent; stipules divided into 2–3 plane, linear-elliptic, subequal segments arising palmately from a short stalk, the longest up to 1.5 cm. long, about 0.2 mm. wide, attenuate-acuminate; leaves up to 35 cm. long, petioles squarrose to angular in cross-section, often nodose at petiolule articulation, the internodal areas thinner (as narrow as 2 mm., the petiole thus subvirgate), or the entire petiole myrmecophilous, up to 22 cm. long, up to 4 mm. wide, or often with distinct myrmecodomatia at base which are elliptic-falcate in profile, up to 5 cm. long, 0.6–1 cm. wide; petiolules subconvex, slender to tumescent, 0.3–1.3 cm. long; leaflets 3- to 5-jugate, coriaceous, densely puberulent to subglabrous above and below, elliptic-lanceolate or narrow to wide-oblong, the lowermost pairs 5–12 cm. long, 2–5 cm. wide, the upper 15–23 (+?) cm. long, up to 8 cm. wide, definitely acuminate at apex, tapering gradually or even sharply at base, obviously inequilateral at base, the costa plane to plano-convex above, prominent beneath, the secondary veins of larger leaflets 8–12, obviously arcuate-ascending, prominulous above and below, rarely evanescent, the reticulate areas prominulous to subevanescent, the margin subrevolute, vaguely callose; inflorescence terminal, paniculate, the branches few or absent, the central rachis obviously thick, 3–5 mm. wide at base, the pedicel-scars very conspicuous when flowers deciduous, the flowers often very quickly deciduous, the inflorescence becoming few-flowered at tip of rachis, or the racemes very obvious, wedge-shaped or narrow-pyramidal, up to 12 cm. long, up to 3.8 cm. wide at base; bracteoles short, subulate, acute, puberulent; receptacle-cup inequilaterally campanulate, the wall thin-coriaceous, up to 0.8 mm. thick, minutely puberulent on outside, the

longer side as seen in hemisection 9–10 mm. long, the shorter side 4.5–8 mm. long, the sepals coriaceous or carnose-coriaceous, concave, pubescent on both sides, oblong to oblong-rotund, 7–8 mm. long, 4–7 mm. wide, obtuse at apex and base, the margin densely ciliolate often with minute glandular bodies interspersed; petals petaloid to thin-subcoriaceous in texture, often vaguely carinate at base, oblong to obpyriform or obovate-rotund, 7.5–10 mm. long, 5.5–7 mm. wide, hirsute within, the hairs concentrated centrally or almost extending to margins, obtuse at apex, distinctly clawed at base; filaments of stamens 10, dimorphic, 7 being slender, subulate, 15–20 mm. long, about 0.3 mm. wide at middle, the other 3 thicker, falcate, up to 11 mm. long, about 0.9 mm. wide at middle, all pubescent at base; stipe of ovary arising about 2 mm. above base of cup, often geniculate in middle, almost equal to shorter side of cup in length, the ovary fusiform to oblong, 4–7.5 mm. long, the style up to 15 (?) mm. long, the ovules 8–9; fruit not seen.

BRAZIL: AMAZONAS: Porto Velho (Rio Madeira), *Ducke 228* (F, NY, MO, US), *35419* (P); Panuré, Rio Vaupes, *Spruce 2553* (MO, photo, NY, P, type collections of *T. paniculata* var. *cavipes*); Rio Negro, San Felipe, *Luetzelburg 22998* (NY); Humayta near Livramento on Rio Livramento, *Krukoff 6816* (MO, US); PARÁ: Belém Utinga, *Ducke 1707* (F, NY, US).

COLOMBIA: VAUPES: Bacuraba Cachoeira, Río Vaupes, e. of Mitú, *Allen 3389* (MO).
PERU: LORETO: Palta-cocha, Upper Río Nanay, *Llewelyn Williams 3192* (F, US).

T. cavipes has long been related to *T. paniculata* Aubl., as a variety of the species. However, it is readily distinguished from typical *T. paniculata* by its thick floral axis rugose with pedicel scars and bearing larger cuneate-pyramidal racemes. Its receptacle-cup is more campanulate than that of the Aublet species.

Allen 3389, with leaflets superficially like those of *T. pubiflora* Benth., has the floral axis more slender (0.3 mm. wide) than in the other cited collections of *T. cavipes*. However, it has the characteristic pedicel scars of the latter species. It is well to note that this specimen has an obvious myrmecodomatium at the base of the petiole which is smaller than in its Brazilian counterparts. Perhaps there is a correlation between the size of the rachis and the size of the myrmecodomatium.

Ducke 1707, labelled by the collector as *T. myrmecophila*, is unfortunately sterile. In my opinion, it belongs to *T. cavipes*, although its scarcely myrmecophilous petiole bases and its subglabrous leaflets (except for the costa and the secondary veins above) seem to challenge this decision. The character of the foliage in general suggests *T. cavipes*.

The following common names are assigned to the Brazilian material of *T. cavipes*: "tachyzeiro", "tachi-preto", and "taxi".

7. TACHIGALIA venusta Dwyer, sp. nov. (T.: *Capucho 418!*).

Arbor 20–30 m.; ramuli terminales puberuli rotundati; stipulae (immaturae) 2–4 linearibus, segmentis 8 mm. longis; folia ad 32 cm. longa; petioluli graciles angulares torti puberuli, circ. 2–2.5 in medio lati, solitario basali myrmecodomatium inaequaliter elliptico, circ. 4 cm. longo, circ. 0.7 cm. lato; petioli plerumque subtumescens subplano-convexi, ad 5 mm. longi, 1–2 mm. lati; foliola 3- vel 5-

jugata in toto sericeo-canescens etiam ea vetusta tenui-coriacea plerumque inaequilateralia subelliptica vel ovato-oblonga (minimis ovatis), 6–15 cm. longa, ad 4.5 cm. lata, apice brevi-acuminata ultime obtusa plerumque inaequilateralia (rare cuneata), latere latiore plerumque subauriculato, costa supra prominula infra prominente basi, circ. 1.1 mm. lata, venis secundariis principalibus $6 \pm$ argute ascendentibus, margine vix evidente; inflorescentiae patenti-paniculatae foliis breviores, rhachide centrale brevi, ad 5 cm. longo, circ. 2 mm. lato, puberulo torto basi, ramulis arcuato-ascendentibus subplano-convexis tortis, ad 7 cm. longis, racemis ad 5 cm. longis, bracteolis subulatis, ad 4 mm. longis; calyx receptaculi cupuliformis subparibus lateribus, latere longiore circ. 4 mm. longo, latere brevior circ. 3 mm. longo, pariete coriaceo crassoque, 0.7–1 mm. lato, extus minute pubescente intus farinoso (ova formicarum?); sepala inaequalia crassiora coriaceaque extus intusque minute canescens oblongo-rotunda, 4–6 mm. longa, 4–4.5 mm. lata, apice obtusa, basi obtusa vel vix spathulata, ciliis longis albis irregularibus in medio corpore dispositis (nullis apice); stamina 10, antheris glabris oblongis, 7 filamentis subulatis, ad $9 \pm$ mm. longis, ad 0.8 mm. latis, 3 latioribus crassioribus fusiformibus, circ. $6 \pm$ mm. longis, ad 1.5 mm. in medio latis, omnibus basi intus fimbriato-ciliatis, ciliis crebris canescentibus saepe reflexis; stipes basi calicis eccentricus, circ. 1.8 mm. longus, ovario in toto crebre canescente; fructus (maturi dehiscentesque) coriacei plani elliptici, 13–15 cm. longi, ad 4.5 cm. lati, apice obtusi et vix retusi, basi cuneati, semine solitario ala tenui lignosaque pericarpium in magnitudine aequante crebre striata.

BRAZIL: AMAZONAS: Manáos, Estrada Salles, *Ducke 1989* (NY); PARÁ: Tapajoz, Boa Vista, *Capucho 418* (F).

T. venusta is readily distinguished by its few-jugate leaflets, pubescent above and below, with the principal secondary veins averaging about 6 in number and curving in a characteristic arcuate pattern. The relatively thick axis of the inflorescence readily links it with *T. cavipes*.

8. TACHIGALIA PUBIFLORA Benth. in Hook. Jour. Bot. 2:94. 1890. (T.: *Schomburgk 43* (33?)!).

Trees; terminal twiglets pubescent; stipules palmately or subpalmately segmented, the segments 3–5, the uppermost usually wider, linear-lanceolate, the lower linear-falcate, the entire stipule 6–16 mm. long, flat, pubescent; leaves up to 26 cm. long; petioles delicately canaliculate, tomentose, flattish to angular, subulate, 2–3 mm. wide at base, indented at point of petiolule-articulation; petiolules often tumescent, up to 6 mm. long; leaflets (2–)3- to 4(–6)-jugate, thin-coriaceous, drying dull gray-green above, dull golden-tan beneath, subequilateral, pubescent above, usually densely sericeous-tomentose below (older leaflets sometimes moderately pubescent), elliptic, up to 14 cm. long, 2–5.5 cm. wide, acuminate (acumen up to 1 cm. long), ultimately acute, subequilateral to obviously inequilateral at base, tapering acutely or obtusely at base, the costa subimmersed above, subpromi-

ment beneath, pubescent, the principal secondary veins 8–12, arcuate-ascending, subimmersed but obvious above, prominent beneath, the reticulations ultimately evanescent, the margin scarcely revolute, pubescent; inflorescence lax-paniculate, elliptic, the branches few (1–3), arcuate-ascending, up to 27 cm. long, the central rachis not strongly angular or squarrose below, 2.5–3 mm. wide at base, pubescent, the racemes narrow-pyramidal, usually 5–12 cm. long, up to 3 cm. wide at base; bracteoles linear-subulate, concave, auriculate at base, 0.4–1 cm. long, pubescent, often falcate at apex; buds inequilaterally obovate, about 1 cm. long at maturity; receptacle-cup inequilaterally cup-shaped, the wall $0.7 \pm$ mm. thick, the longer side as seen in hemisection about 7 mm. long, the shorter side about 3 mm. long; sepals 5, stiff and thick, subpellucid, pubescent on both sides, the hairs silky, often more dense at base, oblong to oblong-rotund, 5–7 mm. long, 3.8–4(–6) mm. wide, obtuse at apex and base, the margin densely ciliolate, usually with small glandular bodies interspersed; petals 5, creamy-yellow (to orange, fide Abraham) in vivo, petaloid, hirsute within at the middle, glabrous on outside, obovate-oblong, 6.5–8 mm. long, 3.5–4.3 mm. wide, obtuse at apex, a fleshy keeled claw extending into corpus; stamens 10, the filaments of 7 linear-subulate, up to 15 mm. long, about 0.5 mm. wide at middle, densely pubescent at base on one side, filaments of 3 obviously thicker (usually wider at middle than at base), falcate, up to 9 mm. long, about 0.6 mm. wide in middle, sparsely hairy at base (one filament in one flower found to be entirely glabrous); stipe obviously eccentric, arising 2–3 mm. above base, short, about 2 mm. long, the ovary distinctly falcate, narrow-rectangular, about 5 mm. long, about 2 mm. wide, its central axis at apex almost at right angles to axis of receptacle-cup, the style linear-subulate, up to 14 mm. long, ciliate to middle; fruit green when ripening, purplish-gray at maturity, glaucous, flat, inequilateral, elliptic, often vaguely falcate, 6.5–11 cm. long, 1.9–2.5 cm. wide, the seed flat, brown, its position marked by a longitudinal ridge on each side of the wing, 2–3 mm. from margin, the wing acute to subobtuse at apex.

BRITISH GUIANA: Cuyuni River, Oko Creek, *Tutin* 339 (US); New River, Berbice Co., *Anderson* 72 (US); Berbice, Rupununi Cattle Trail, *Abraham* 253 (NY); Potaro River, Tumatumari, *Gleason* 416 (NY, US); Demerara, *Jenman* 5824 (NY), 6705 (NY); Mazaruni River, *Leng* 267 (NY), 293 (NY); Kaieteur Plateau, Potaro River below Tukeit, *Maguire & Fanshawe* 23483 (MO, NY, US); Caracara Creek, *Persaud* 24 (F, NY); Essequibo River, *Sandwith* 221 (NY, P); Essequibo, *Schomburgk* 43 (33?) (MO, P, US); without locality, *Schomburgk* 322 (P).

Despite traditional acceptance of *T. pubiflora* I cannot distinguish it readily from typical *T. paniculata* Aubl. The strongest distinguishing characters are the persistent pubescence of the underside of the leaflets and the absence of myrmecodomatia. The former character, in light of my own observations on *T. paniculata*, *T. pubiflora*, and *T. rigida*, is very variable and should be employed with caution; the latter character is negative and as such is useful but scarcely convincing, especially when one considers that the majority of the collections of such a widely heralded myrmecophilous species as *T. paniculata* is also without myrmecodomatia. The shapes of the petioles of the two species, as seen in cross-section, are too vari-

able to be employed as a critical distinguishing character. While the arcuate bending of the stipe and of the ovary is striking, nevertheless it is found in the variety *angustifolia* of *T. paniculata*. In general, the leaflets of *T. pubiflora* tend to be more elliptic, narrower, and more equilateral than in *T. paniculata*; in most collections the leaflets tend to taper more sharply at the base.

If the collection *Le Prieur 336* (not to be confused with the extant *Le Prieur 355*) from British Guiana is ever located, it may prove to be *T. pubiflora*. It is the type of *T. glauca* Tul. Both Bentham and Ducke mention that they have not seen the type.

On the Tutin collection (339) the common name, "Yawaridan", is recorded.

Krebs (*Tropical Woods* 13:28. 1928) has a description of the wood anatomy of *Persaud 24*.

9. *TACHIGALIA PANICULATA* Aubl. Hist. Pl. Guin. 1:372. 1775.

Tachigalia trigona Aubl. Hist. Pl. Guin. 1:372. 1775.

Tachigalia sericea Tul. in Arch. Mus. Nat. d'Hist. Nat. 4:163. 1844.

Tachigalia eriocalyx Tul. in Arch. Mus. Nat. d'Hist. Nat. 4:164. 1844.

Tachigalia angustifolia Miq. Sel. Stirp. 13. 1850.

Tachigalia alba Ducke, in Arch. Jard. Bot. Rio de Janeiro 3:92. 1922.

Tachigalia sulcata Benoist, in Bull. Mus. Nat. d'Hist. Nat. 31:469. 1925.

Tachigalia carinata Gleason, in Bull. Torrey Bot. Club 60:354. 1933.

Tree; ultimate twigs round in cross-section, glabrous to puberulent; stipules varying considerably according to age and habitat, often foliose, subcoriaceous, puberulent, segmented, the segments 2-7 (if 2 or 3 the uppermost segment larger), palmately disposed, the terminal segment broadly ovate to elliptic, up to 1.5 cm. long, the basal segments narrower, trapeziform to elliptic, acute; leaves up to 80 cm. long; petioles angular in cross-section, usually subtriangular, virgate to thick, often subcarinate, usually densely puberulent, usually expanded proximally where attached to twiglet, often with myrmecodomatia at base, these elliptic, 3-5 mm. long, puberulent to subglabrous; leaflets (2-) 3-7 (-9)-jugate, thin- to thick-coriaceous depending on exposure and habitat, inequilateral, subglabrous to microscopically puberulent above, subglabrous to densely puberulent below, often minutely furfuraceous below, the costa slender, prominulous above, subprominent beneath, pubescent above and below, the principal secondary veins 7-15, prominulous above and below, pubescent, acuminate or rarely acute (acumen up to 2 cm. long), ultimately obtuse or acute, the base obtuse to rarely subauriculate on wider side (rarely on both sides), the margin thin-callose; inflorescence lax-paniculate, often exceeding uppermost leaves, the central rachis rounded or angular in cross-section, subvirgate to stout, 2-3.5 mm. wide at base, often rugose with pedicel scars, the latter spirally arranged, the branches few to numerous, arcuate, the racemes narrow-pyramidal, up to 15 cm. long, up to 4 cm. wide at base (pressed condition), usually much shorter when basal flowers quickly deciduous, the bracteoles densely puberulent, falcate, subulate, 3-6 mm. long, acute; flowers long- to short-pedicellate; receptacle-cup inequilaterally cup-shaped to "pipe-bowl"

shaped, the wall brittle-carnose to subcoriaceous, the longer side as seen in hemisection (3.5–)4–8 mm. long, the shorter side 2–4.5 mm. long, pubescent on outside, often ribbed, glabrous within; sepals 5, unequal, carnose, oblong, subrotund to subtriangular, the smaller 3.5–6 mm. long, 3–4 mm. wide, the larger 4.5–8 mm. long, 4–6 mm. wide, obtuse, the margin ciliolate with small red glandular bodies often interspersed; petals 5, thin, subequal in length, unequal in width, oblong to elliptic, 5–11 mm. long, 2–5.5 mm. wide, obtuse at apex, obtuse and often somewhat clawed at base, the hairs more or less restricted to the center or below middle; stamens 10, the filaments of two shapes and sizes, 3 (?) being thicker, 6–12 mm. long, 0.6–1 mm. wide in middle, 7 being 13–21 mm. long, 0.3–0.5 mm. wide in middle, all bearded at base, especially so within; the anthers oblong; stipe of pistil 2–3.5 mm. long, pubescent; ovary oblong, 3.5–4.5 mm. long, 1.8–2 mm. wide, uniformly appressed-hirsute, the type elongate, pubescent, especially below; fruit flat (mature fruit not seen), oblong, coriaceous; monospermate.

Locality unknown: *Barbier s. n.* (P).

FRENCH GUIANA: Kourou River, *Richard s. n.* (P); Cayenne, *Aublet s. n.* (F, MO, photo of type collection of *T. paniculata*); Cayenne, *Martin s. n.* (F); Maroni, *Mélinon 186* (F, P, US); without locality, *Le Prieur 355* (P).

BRAZIL: PARÁ: without specific locality, *Poeppig 3039* (F, syntype of *T. sericea*); Fordlandia, Tapajoz River, *Krukoff 1049* (NY); Belém, Agna Preta, *Ducke 1713* (F, NY, US); cataracts, Ariperecuru, *Spruce s. n.* (NY); AMAZONAS: Santa Izabel, Rio Negro, *Ducke 326* (F, MO, NY, US); Manáos, Igarapé da Cachoeira Grande, *Ducke 2006* (NY, US); Ega, *Poeppig 2737* (F, type collection of *T. eriocalyx*); São Paulo de Olivença, near Palmares, *Krukoff 8252* (MO); São Paulo de Olivença, basin of Belém Creek, *Krukoff 8748* (F); Rio Negro, Barra, *Spruce 1677* (F, photo, NY, P, US); MATTO GROSSO: Tabajaza, upper Rio Machado, *Krukoff 1479* (NY, type collection of *T. carinata*).

PERU: LORETO: without locality, *Tessmann 6136* (F, frag.); Upper Amazonas, *Tessmann 3666* (F, frag.); Gamitanacocha, Rio Mazán, *Schuncke 26* (F, US); Mishuyacu near Iquitos, *Klug 1447* (F, NY, US); Iquitos, *Tessmann 3580* (NY); without specific locality, *Ule 6196* (F).

I have seen only a photograph of the Aublet type. It, together with most of the other material cited above, has narrow oblong leaflets which are moderately coriaceous. In general, *T. paniculata* is not readily confused with other species of the genus, with the exception of *T. pubiflora* Benth (cf. the discussion following the description of the latter¹²).

Var. *a. angustifolia* (Miq.), Dwyer, stat. nov. (T.: *Kappler 1931!*).

Tachigalia angustifolia Miq. Sel. Stirp. 13. 1850.

Petioli saepe elongato-flabelliformes; foliola magna oblonga, circ. 20 cm. longa; calyx receptaculi extus costatus inequilateralis angusto-cylindricus, latere breve 4–8 mm. longo, latere longo 6–9 mm. longo, stipite ovarii angusto, 4–6 mm. longo.

¹²Bailey (loc. cit.), in his work on *T. paniculata*, says the species is fairly common in the second growth of the forests of the Kartabo region (British Guiana). Apparently he sent samples to Col. David Prain, Director of Kew Gardens, who matched them with the solitary leaf of a Jenman collection, identifying the latter as *T. paniculata*. Inasmuch as Bailey describes the "hollow fusiform hypertrophy of the petiole" of his material, and since the well-known British Guiana species, *T. pubiflora*, lacks the basal hypertrophy of the petiole, we may assume that the species in question is *T. pubiflora*. If this be so, it establishes the fact that *T. paniculata* is found in British Guiana.

SURINAM: Tafelburg Creek, Saramacca River, *Maguire 24896* (MO, NY, US, P); Marowyne River, *Kappler 1931* (P); Toekoemoetoe, *B. W. 5615* (MO, US); Toekoemoetoe, *Stabel 6340* (US).

FRENCH GUIANA: Maroni, Ile Portal, *Sagot 1107* (P).

Two characters mark this variety: first, the very large oblong leaflets, and second, the very long stipe of the ovary. The leaflets are the largest found among the varieties of *T. paniculata*, as well as among all the species of the genus, and only one species of *Tachigalia* has an ovary stipe of comparable length, *T. pulchra* Dwyer.

Var. β . *sulcata* (Benoist) Dwyer, stat. nov. (T.: *Benoist 1574!*).

Tachigalia sulcata Benoist, in Bull. Mus. Nat. d'Hist. Nat. 31:469. 1925.

Foliola tenui-coriacea, ad 9 cm. longa, ad 3 cm. lata; petioli subvirgati; ovarium subsessile.

FRENCH GUIANA: Gourdonville, *Benoist 1574* (P).

This variety is readily distinguished by its sessile ovary. No other species of *Tachigalia* possesses an estipitate ovary. In addition, the leaflets are thinner than in any other species with the possible exception of *T. agyrophylla*.

Var. γ . *comosa* Dwyer, var. nov. (T.: *Krukoff 8854!*).

Petala alba vel roseo-alba; corpora petalorum et filamenta staminum et ovaria dense comosa ciliis irregularibus elongatis ad 1.3 mm.

COLOMBIA: AMAZONAS: Trapecio Amazonico, Loreto-yuca River, *Schultes 8266* (US), *Schultes & Black 8360* (US).

BRAZIL: AMAZONAS: São Paulo de Olivença, basin of Creek Belem, *Krukoff 8854* (MO).

The dense pubescence of the perianth parts enumerated above is unmatched by any other species of the genus, or in any other variety of *T. paniculata*. According to Schultes & Black's field-notes the vernacular name is "Ko-ne-kwa-cha-ku."

Var. δ . *alba* (Ducke) Dwyer, stat. nov.

Tachigalia alba Ducke in Arch. Jard. Bot. Rio de Janeiro 3:92. 1922. (Syntypes: *Ducke 17110, 17075!*).

Foliola plerumque lanceolata vel oblongo-lanceolata (minima ovata), circ. 10 cm. longa; petioli virgati; racemae plerumque elongatae, floribus parvis albis vel fulvis; calyx receptaculi parvus, ad 5 mm. longus; fructus oblongus, ad 12 cm. longus, ad 5 cm. latus.

BRAZIL: MARANHÃO: Maracassumé River, *Froes 1942* (MO, NY); PARÁ: Obidos, *Ducke 17110* (MO, photo, US); lower cataracts, Tapajoz, *Ducke 17075* (P, US); Boa Vista, Tapajoz River, *R. Monteiro da Costa 48* (F); Boa Vista, Tapajoz, *Capucho 348* (F); AMAZONAS: Santa Izabel, Rio Negro, *Ducke 326* (F, MO, NY, US); Humaytá, Tres Casas, Basin Rio Madeira, *Krukoff 6326* (US); São Paulo de Olivença, *Ducke 937* (F, NY, US); Manaós beyond Flores, *Ducke 932* (MO, NY, US); mouth of Rio Embira, basin Rio Jurua, *Krukoff 4633* (MO, NY); ACRE: mouth of Rio Macauha, basin Rio Purus, *Krukoff 5586* (F, MO, NY, US).

It is with some hesitation that I reduce Ducke's species to the status of a variety. Its small receptacle-cup favors its retention as a distinct species. However, I am not able to find any other substantial character to support this retention; certainly the color of the flowers is variable (yellow to white); this seems to make the name "alba" a poor one¹³. The common names for the new variety are "Tachy Branco" and "Tachy Branco da Terre Ferme."

10. TACHIGALIA ULEI Harms, in Notizbl. Bot. Gart. Berlin 6:306. 1915. (T.: *Ule 6042!*).

Trees 5–15 m.; twiglets subterete or angular at apex, glabrous to subglabrous; stipules of 2–3 linear segments subequal in length (when two present), the longer 1.5–1.7 cm. long, the shorter 1.2 cm. long; petioles 6–10 cm. long, apparently angular in cross-section, about 2.5 mm. wide at base, the basal myrmecodomatia oblong, 3.2–3.8 cm. long, 0.5–0.8 cm. wide; petiolules twisted, about 2.5 mm. long, pubescent; leaflets (2?–) 3- to 4-jugate, thin-coriaceous, subfalcate, oblong, 8–9 cm. long, up to 7.5 cm. wide, acuminate to ultimately very obtuse and minutely apiculate at apex, inequilateral at base, the costa prominent above and below, minutely pubescent, about 2 mm. wide at base, the principal secondary veins $8 \pm$, almost prominent above and below, arcuate-ascending, the reticulate areas lax above, the smallest of these evanescent below, the margin thin-callose, revolute; inflorescence lax-paniculate, corymbiform or somewhat funnelform, about 35 cm. long, the central rachis about 3 mm. wide, the branches usually arcuate-ascending, 12.5–22 cm. long; bracteoles not seen; receptacle-cup short, irregularly funnelform, the wall about 0.7 mm. thick, velutinous on outside, the shorter side as seen in hemisection about 3 mm. long, the longer side about 5 mm. long; sepals thick to subcoriaceous, somewhat woolly on both sides, ovate-oblong to oblong-rotund, 3.5–6 mm. long, 2.8–5 mm. wide, obtuse at apex and base, the margin densely ciliolate; petals subequal, petaloid (except thick at base), long-hirsute medianly within, appressed-hirsute on outside at base only, obtuse at apex, vaguely clawed at base; stamens 10, the filaments of 7 subulate, up to 14 mm. long, about 0.3 mm. wide in middle, bearded all around at base, the 3 remaining thickly subulate, 5–6.5 mm. long, about 0.9 mm. wide in middle, the hairs dense on one side below the middle; stipe short, thick, arising in the middle of receptacle-cup, the ovary narrow-rectangular in profile, about 5 mm. long, about 2 mm. wide, woolly-pubescent; fruit not seen.

BRAZIL: AMAZONAS: Rio Negro, *Ule 6042* (F, photo and frag., MO, photo).

T. ulei, described from a photograph and a few fragments of a leaflet and a flower, is readily distinguished by its few-jugate leaves with the costa of the leaflets prominent, its flat-topped funnelform inflorescence (in pressed state), and woolly sepals and ovary.

¹³Ducke, in his original description, applies the adjective "albidus" to the cortex of the trunk and to the petals of the flowers. He does not make it clear whether he bases the specific name "alba" on both structures or on the petals alone. One of his collections (932), labelled in his own handwriting as *T. alba*, bears the note that the flowers are yellow.

11. *TACHIGALIA PLUMBEA* Ducke, in Bol. Técn. Inst. Agron. Norte Bras. 2:15. 1944. (T.: *Ducke 817!*).

Trees; terminal twigs subrotund in cross-section, minutely sericeous; stipules often persistent, foliose, bearing a solitary reduced basal segment, coriaceous, puberulent, oblong to ovate-oblong, 1.6–3 cm. long, 1–1.3 cm. wide, obtuse to subacute, the basal segment narrow falcate-lanceolate, up to 1.7 cm. long; leaves up to 30 cm. long; petioles thick, subrectangular in cross-section, pubescent, up to 10 cm. long, the basal myrmecodomatia 2.5–3.5 cm. long, about 0.6 cm. wide; petiolules swollen, plano-convex, pubescent, 4–7 mm. long, up to 3.5 mm. wide; leaflets 3- to 5-jugate, the terminal pairs often about twice the size of the basal pairs, the members of each pair somewhat unequal in length, coriaceous, minutely velutinous above and below, inequilateral, lanceolate, 7.5–20 cm. long, the larger leaflets about a third as wide as long, acuminate at apex, obtuse at base, the costa prominulous above, prominent beneath, 0.7–1 mm. wide at base, the principal secondary veins 7 to 12, arcuate-ascending, subprominulous to plane above, prominulous beneath, the ultimate reticulations evanescent to distinctly prominulous above, prominulous beneath; inflorescence lax-paniculate, the central rachis up to 14 cm. long, 0.35 mm. wide at base, the branches arcuate-ascending, contorted, triangular to angular in cross-section, up to 3 mm. wide at base, up to 15 cm. long, the terminal racemes narrow-pyramidal, about 6 cm. long, about 3 cm. wide at base, the rachis at base often rough with pedicel scars; bracteoles subulate, pubescent, about 5 mm. long; buds obliquely pyriform, about 1 cm. long at maturity; receptacle-cup caliciform, the wall very thick, 0.8–1.4 mm. thick, the longer side as viewed in hemisection 4.5–5.5 mm. long, the shorter side 2.5–3.5 mm. long, pubescent on outside, glandular-shiny and glabrous within, the internal cavity not spacious; sepals 5, 2 obviously smaller and thicker, all stiff and thick-subcoriaceous, densely velutinous on both sides, lanceolate, oblong to subrotund, 5–6 mm. long, 2.2–5.5 mm. wide, obtuse at apex and at base, the margin densely ciliolate; petals 5, pale-yellow, petaloid (except thick at base), long-appressed-hirsute within, glabrous on outside, obovate-rotund to obovate-oblong, up to 7 mm. long, about 4 mm. wide, obtuse at apex, often obviously clawed at base, the margin undulate; stamens 10, 7 filaments of which are more subulate and densely hairy at base on inside, the remaining 3 scarcely falcate to obviously so, as wide in the middle as at base, the basal hairs scattered, almost absent at point of attachment; stipe of pistil attached less than 1 mm. above the center of receptacle-cup, erect, stout, pubescent, about 2.5 mm. long, the ovary narrow-oblong, pubescent, the style apparently entirely glabrous; fruit not seen.

VENEZUELA: AMAZONAS: Solano, Lower Casiquiare, *Llewelyn Williams 14734* (F).

BRAZIL: AMAZONAS: Manáos, Estrada Campos Salles, *Ducke 24289* (P, US); Manáos, Pensador, *Ducke 817* (NY, US); Manaós near Cachoeira do Mindu, *Ducke 818* (MO, US).

12. *TACHIGALIA GRANDISTIPULATA* Harms ex Pilg. in Notizbl. Bot. Gart. Berlin 6:304. 1915. (T.: *Ule 8399!*).

Trees; terminal twigs velutinous or subglabrescent; stipules large, foliose, segmented, with one large plane ovate-oblong segment 6–6.5 cm. long, and a smaller ovate basal segment 2.5 cm. long, 1.5 cm. wide; petioles thick (about 5 mm. wide in middle), often virgate at apex, 10–18 (–25) cm. long, bearing (at least in one leaf here) a basal myrmecodomatium 3.5 cm. long, about 0.75 cm. wide; petiolules tumescent, pubescent, 3.5–5 mm. long; leaves 4(–5)- to 6-jugate, the leaflets coriaceous, pubescent above and below, velutinous below, apparently ovate-oblong, up to 11 cm. long, up to 5 cm. wide, triangular- to long-acuminate to obtuse (?) at apex, the larger ones obtuse and not markedly inequilateral at base, the smaller ones obviously inequilateral, the costa prominulous above, more prominent beneath, velutinous, the principal secondary veins 8 to 10 (+?), arcuate-ascending, the ultimate reticulations fine but obvious under magnification, prominulous and lax below, often plane above; inflorescence lax-paniculate, up to 18 cm. long, the central axis subrotund in cross-section, about 0.25 cm. wide proximally, the branches strongly divergent to arcuate-ascending, up to 15 cm. long, 1.8–2.5 mm. wide in middle, usually averaging about 10 cm. in length, the terminal racemes 2–5 cm. long, $2 \pm$ cm. in length on lower branches; bracteoles concave, pubescent, linear-subulate, 3–4 mm. long; buds silky-pubescent, narrowly obovate-oblong, about 8 mm. long; receptacle-cup short, inequilaterally funnelform, carnose, the wall about 0.6 mm. thick, the longer side as seen in hemisection 3–3.5 mm. long, the narrow side 1–1.5 mm. long, pubescent on outside, glabrous and apparently vaguely ribbed within; sepals 5, 2 smaller and thinner, carnose-subcoriaceous, concave, appressed-velutinous on both sides, oblong, obovate-oblong to oblong-rotund, 4.2–5 mm. long, 2.3–3 mm. wide, obtuse at apex and base, the margin densely ciliolate with red glandular bodies interspersed; petals petaloid, scattered-hirsute within medianly, glabrous on outside, obovate-oblong, 6–8 mm. long, 3–3.5 mm. wide, obtuse at apex, often clawed at base; stamens 10, the filaments unequal, essentially monomorphic, linear-subulate, 6–9 mm. long, 0.5–0.8 mm. wide at base, hirsute within for 3 mm. above base; stipe of pistil eccentric, arising about 1 mm. above base of receptacle-cup, pubescent, about 3 mm. long, 0.7 mm. wide in middle, suberect, the ovary densely velutinous, oblong-rectangular, the ovules seven; fruit not seen.

BRAZIL: AMAZONAS: Serra de Mairary, Surumu, Rio Branco, *Ule 8399* (F, photo, and frag., MO, photo).

Unfortunately, I have not seen a complete type-specimen. The only apparent distinguishing vegetative character is the very large stipules. Fortunately, flowers were available for dissection. These show a receptacle-cup which is "check-mark" shaped in profile, i.e. as seen in hemisection; the shorter side scarcely exceeds a millimeter in length. I have not observed a similar reduction of one side of the receptacle-cup wall in any of the other large-flowered species of *Tachigalia*.

13. *TACHIGALIA MYRMECOPHILA* (Ducke) Ducke, in Arch. Jard. Bot. Rio de Janeiro 3:91. 1922.

Sclerolobium myrmecophilum Ducke, in Arch. Jard. Bot. Rio de Janeiro 1:30. 1915. (T.: Ducke 15659!).

Large trees; twiglets round in cross-section, densely puberulent; stipules subcoriaceous, puberulent, of two segments, the upper one obliquely oblong-rotund, 1.5–2 mm. long, about 0.8 cm. wide, the basal segment shorter, narrow-elliptic, acute; leaves up to 30 cm. long; petioles subrotund, scarcely angular, densely puberulent, often moderately swollen from base to tip, the myrmecodomatia 2–3 cm. from base, elliptic, 2–3.5 cm. long, 1.5–2.5 cm. wide; petiolules slender, tumescent, 4–8 mm. long, puberulent; leaflets 2- to 4-jugate, sericeous-puberulent above and below (apparently even in mature leaflets), inequilateral, elliptic, oblong or ovate-oblong, 7–20 cm. long, 3–6 cm. wide, a little more than one-fourth as long as broad, obviously acuminate at apex, ultimately acute or obtuse, inequilateral, cuneate or obtuse at base, the costa prominulous to plane above, prominulous to prominent beneath, the principal secondary veins 8 to 10, prominulous above and below, arcuate-ascending, the ultimate finely reticulate; inflorescence lax-paniculate, the branches numerous, arcuate-ascending, 1.5–2 mm. wide in middle, conspicuously rugose with pedicel scars extending almost to base, the central floral axis exceeding (here) the side branches, all densely puberulent, the racemes shaped like a lizard-tail, some up to 14 cm. long, about 2.5 cm. wide at base, flowers soon deciduous, a few terminal ones persisting; bracteoles puberulent, concave, subulate, 5 mm. long, acute; receptacle-cup short and obliquely cup-shaped, the wall about 0.5 mm. thick, the shorter side as seen in hemisection 1.5–2 mm. long, the longer side 3.5–4 mm. long, pubescent on outside; sepals thin-subcoriaceous or thin-carnose, pubescent on both sides, oblong, often widely so, (2.8–) 3–5 mm. long, 2–4 mm. wide, obtuse at apex and base, occasionally broader than long; petals thin-carnose, petaloid, narrow-oblong, 4.5–5 mm. long, 1.5–2.2 mm. wide, distinctly to vaguely clawed, bearing a few scattered hairs on inside; stamens often dimorphic, some filaments measuring 0.4 mm. in width at middle, the others 0.6 mm., some 8–11 mm. long, some 5–8 mm. long; stipe of ovary short, 1–2 mm. long, sub-sigmoidal to erect, the ovary oblong, about 4 mm. long, the style short; fruit (fide Ducke) whitish-canescens, silky-pubescent, monospermate, 8–10 cm. long at maturity, 1.7–2 cm. wide, acute or obtuse at apex, shortly stipitate at base.

FRENCH GUIANA: *Le Prieur s. n.* (P).

BRAZIL: PARÁ: *Huber 646* (F, US); Rio Tapajoz, São Luiz, *Ducke 15819* (MO, photo, P, US, photo); Belém, *Ducke 15659* (F, photo and frag., MO, photo, US); Belém, Bosque Municipal, *Ducke 1706* (F, NY, US).

T. myrmecophila is readily confused with *T. paniculata*. However, its individuality is evident when one examines the flowers critically; the receptacle-cup is much smaller than in the Aublet species, the petals are only scattered-pubescent within, and the filaments of the stamens do not exceed 11 mm. in length. Unlike

those of *T. paniculata* the leaflets of *T. myrmecophila* are apparently densely sericeous even in the mature state. The racemes bear a striking resemblance to those of our North American cimicifugas in their length and narrowness.

The unnumbered Le Prieur collection from French Guiana, while bearing immature flowers, certainly seems to have the foliage of typical *T. myrmecophila*.

"Tachy" and "Tachi-Preto" are two common names of the species. According to Hess and Record (Timbers of New World. p. 330. 1943), the wood of *T. myrmecophila* is very fetid in the fresh state; the bark is used locally in tanning.

14. *TACHIGALIA FORMICARUM* Harms, in Verhandl. Bot. Ver. Brandenb. 48:164. 1907. (T.: *Ule 6538!*).

Trees about 20 m. high; stipules plane, foliose, pinnate, the central segment elongate, narrow and inequilaterally oblong, about 2.2 cm. long, about 1 cm. wide, 2 basal segments on each side, linear, about 1.2 cm. long, acute; leaves up to 25 cm. long; petiole swollen at base, the basal myrmecodomatia 5–6 cm. long, about 1.2 cm. wide; petiolules scarcely swollen, about 5 mm. long; leaflets 4–6-jugate (the upper pairs larger and narrower), inequilateral, glabrous except for the veins, oblong, up to 16.5 cm. long, up to 4.5 cm. wide, triangular-acuminate, ultimately obtuse, obviously inequilateral and obtuse at base, the wider side subauriculate, the costa subimmersed to subprominulous above, prominent beneath, the principal secondary veins pubescent above and below, prominent above, prominent beneath, the reticulations prominulous above and below, very conspicuous under magnification, ultimately distinct; inflorescence lax-paniculate, the branches divergent but not sharply ascending, almost the entire floral axis disposed as a myrmecodomatium, the axis about 9 mm. wide at base, about 5 mm. wide at apex, the lateral branches swollen, up to 22 cm. long, about 0.6 cm. wide at base, the racemes cylindrical, 5–7.5 cm. long, about 1.8 cm. wide at base and at middle; bracteoles coriaceous, pubescent, triangular, about 2 mm. long, about 1.8 mm. wide at base; buds rotund; receptacle-cup scarcely pedicellate, scarcely inequilateral, cupuliform, the wall coriaceous to carnose, about 0.4 mm. thick, puberulent on outside, glabrous and furfuraceous within (ant eggs?), the longer side as seen in hemisection 2.5–3 mm. long, the shorter side about 2 mm. long; sepals 5, small, concave, thick-subcoriaceous, pubescent on outside, puberulent and furfuraceous (ant eggs?) within, oblong to oblong-rotund, up to 4 mm. long, 2–3 mm. wide, obtuse at apex and base, the three largest subpellucid only on margins; petals subequal in size, petaloid, thick at base, glabrous on outside, densely hirsute within, the long scraggly hairs extending beyond margins, obovate-oblong to oblong, about 4 mm. long, about 2 mm. wide, obtuse at apex, obviously clawed at base; stamens 10, the filaments monomorphic, subulate, 4–6 mm. long, about 0.8 mm. wide in middle, the hairs long and scraggly on lower $\frac{2}{5}$ on inside only; stipe of pistil shorter than cup, erect, the ovary suberect, velutinous, oblong, about 3.2 mm. long, about 1.5 mm. wide, the style eccentric, scattered-ciliate almost to apex; fruit not seen.

PERU: LORETO: Tarapoto, *Ule* 6538 (F, MO, photo); Aguaytia, *Weytkowski* 34445 (MO).

The equilateral nature of the receptacle-cup as viewed in hemisection readily distinguishes *T. formicarum*; in fact undissected flowers bear a striking resemblance to those of *Sclerolobium*. However, the eccentric stipe suggests that the species belongs to the genus *Tachigalia*. The petals and sepals are of the same length, an unusual condition for the genus. The long scraggly hairs of the inner face of the petals and at the base of the stamens are longer than those of other species of *Tachigalia*. No other species of the genus has the filaments of the stamens so reduced in size. The close relationship between *T. formicarum* and *T. myrmecophila* is evidenced by their racemes; the latter resemble those of our North American cimicifugas.

The field-notes on the label of *Weytkowski* 34445 are very enlightening: "Tree 12 m. high; flowers orange-yellow, anthers yellow, stalk green; flowers very fragrant; leaves very deep-green. Full of Tangarana ants which sting painfully."

15. TACHIGALIA POLYPHYLLA Poepp. & Endl. Nov. Gen. et Sp. 3:60. 1844. (T.: *Poeppig* 2837!).

Tachigalia poeppigiana Tul. in Arch. Mus. Nat. d'Hist. Nat. 4:168. 1844.

Terminal twiglets drying purple-black, smooth, rounded in cross-section, vaguely canaliculate; stipules not seen; leaves up to 25 cm. long; petioles virgate, pubescent, delicately canaliculate, up to 23 cm. long, about 0.2 mm. wide in middle, often with a myrmecodomatium about 7 cm. from proximal end which is 3–3.5 cm. long, 0.5–0.6 cm. wide; petiolules tumescent, 3–4 mm. long; leaflets 7- to 12-jugate, thin-coriaceous, subequilateral to obviously inequilateral, minutely pubescent above and below (at least on costa above), purplish-brown beneath, oblong-sublanceolate to narrow-oblong above, up to 9 cm. long, up to 2.5 cm. wide, acuminate at apex (acumen 0.8–1.2 cm. long), inequilateral at base, cordate-auriculate on wider side, often tapering narrowly on narrow side, the costa plane or prominulous above, prominent beneath, pubescent, the principal secondary veins $8 \pm$, prominulous above, subprominent beneath, the reticulations prominulous, lax, the margin scarcely differentiated, vaguely revolute; inflorescence paniculate, the floral axis about 3 mm. wide at base, usually about 0.8 mm. wide distally, velutinous, the branches 6–15 cm. long, about 0.15 mm. wide at base; bracteoles linear-subulate; pedicels about 1.5 mm. long; receptacle-cup small, thick-subcoriaceous, the wall about 0.5 mm. thick, pubescent on outside, glabrous within, inequilaterally oblong-rotund, obviously wider than long, the longer side as seen in hemisection about 3 mm. long, the shorter side about 1.5 mm. long; sepals 5, thin-carnose, pubescent on both sides, oblong, sublanceolate to rotund, 2.5–2.8 mm. long, 2–2.5 mm. wide, the veins evident, the margin ciliolate; petals 5, thin-pellucid, glabrous on outside, densely long-hirsute within, the hairs irregular, obovate-oblong to oblong, 3.2–4 mm. long, 2–2.2 mm. wide, obtuse at apex, obviously clawed at base, the veins evident; stamens 10, the filaments subequal, linear-subulate, 6–7.5

mm. long, about 0.35 mm. wide at base, the hairs densely lanose below middle, the anthers oblong-rotund, about 0.8 mm. long; stipe of ovary about 0.5 mm. long, slender, pubescent, the ovary oblong, sericeous, the hairs subappressed, elongate, about 2 mm. long, about 0.2 mm. wide, the style eccentric, the ovules about 8; fruit not seen.

BRAZIL: AMAZONAS: Fonteboa, *Ducke 20345* (US); Borba, Rio Madeira, *Ducke 23271* (US); Humaytá between Monte Christo and Santa Victoria on Rio Ipixuna, *Krukoff 7233* (MO, US); Ega, *Poeppig 2837* (P), *Poeppig s. n.* (F, frag.).

T. polyphylla is one of the most easily recognized species of the genus. It is readily distinguished from *T. multijuga* Benth., the only other species of the genus with numerous pairs of leaflets. The very small flowers with very short receptacle-cups suggest *Sclerolobium*. However, the eccentric stipe and inequilateral receptacle-cup exclude them from this genus.

Coupled with the very small flowers and characteristically shaped receptacle-cup are other characters of note: leaflet pairs are occasionally alternate; the petals are densely hairy with long irregular hairs; and the filaments of the stamens are lanose at the base.

There is a fine plate (*t. 265*) of *T. polyphylla* in Poepp. & Endl. Nov. Gen. et Sp. (3:60. 1844). The common name of *T. polyphylla*, according to Ducke's label, is "Tachy."

16. TACHIGALIA AGYROPHYLLA Ducke, in Bol. Técn. Inst. Agron. Norte Bras. 2:14. 1944. (Syntypes: *Ducke 936*, *Ducke 937!*).

Large trees; terminal twiglets round in cross-section, virescent and velutinous; stipules not seen; leaves up to 29 cm. long; petioles up to 21 cm. long, virgate, virescent and velutinous, angular in cross-section, about 0.15 cm. in middle, with a myrmecodomatium about 2 cm. above point of articulation, oblong, 2.5–3 cm. long, about 1 cm. wide; petiolules slender; leaflets 6- to 7-jugate, stiff-chartaceous, inequilateral, lustrous, velutinous above and below, ovate-elliptic to elliptic, the lower pairs smaller than upper pairs, 7–11.5 cm. long, 2.5–3.8 cm. wide, gradually acuminate at apex (acumen up to 1 cm. long), obtuse and minutely apiculate, inequilateral at base, the narrow side obtuse to acute, the wider side in the larger leaflets obtuse to subauriculate, the costa plane above, about 1 mm. wide at base, prominent beneath, the principal secondary veins 4 to 5 per side, angular-ascending, at least the proximal part soon obviously arcuate-ascending, prominulous and conspicuous above, prominent beneath, the intermediate and ultimate reticulations prominulous, evident above and below; inflorescence densely branched, the panicle lax, the floral axis up to 18 cm. long, about 0.3 cm. wide at base, smooth, velutinous, delicately canaliculate, the branches arcuate to sharply ascending, 7–10 cm. long, about 0.11 cm. wide at base, floriferous almost to base; bracteoles concave, subcarinate at base, pubescent, subulate, about 5 mm. long, acute; pedicel about 3.5 mm. long, pubescent; receptacle-cup inequilaterally caliciform, tapering gradually toward base, carnose, the wall about 0.5 mm. thick, the longer side of the cup as

seen in hemisection about 3.5 mm. long, the shorter side 2.5–2.8 mm. long; sepals 5, thin-carnose, often stiffly so, velutinous on both sides, the 2 smaller ovate-rotund, usually wider than long, about 3 mm. long, about 3.5 mm. wide, tapering obtusely at apex, the 3 larger ones rotund to oblong-rotund, about 4.5 mm. long, about 4 mm. wide, the marginal veins evident, the margin ciliolose; petals 5, petaloid, concave, glabrous on outside, densely irregular-hirsute within almost to margin, with hairs scattered below middle on outside, more numerous at base, oblong to obovate-oblong, 4.2–5 mm. long, 3–3.5 mm. wide, obtuse to rounded at apex, short-clawed at base, the veins striate; stamens 10, apparently all more or less similar in shape and width, subulate, some bent falcately, 7–9 mm. long, 0.6–0.8 mm. wide at base, the hairs on inner side only below middle, more dense at apex of pubescent area; stipe of pistil thick, arising about 0.5 mm. from base of receptacle-cup, the ovary densely hairy, about 4 mm. long, about 1.7 mm. wide, curved falcately, the stigma apparently bifid; fruit not seen.

BRAZIL: AMAZONAS: Rio Negro, Paraná de Anavilhana between the mouths of the Araras and Cuieras Rivers, *Ducke 936, 937* (F, MO, NY).

T. agyrophylla is marked by a number of distinguishing characters: the leaflets are few, chartaceous in texture, usually ovate-elliptic in shape, with relatively few secondary veins arising abruptly. The inflorescence is many-branched with very slender branches; the flowers are very small with the receptacle-cup very reduced, the petals are densely pubescent almost to the margins, the stamens are submonomorphic, and the stigma bifid.¹⁴ The majority of these characters is found in *T. formicarum* and *T. polyphylla* and suggest that the trio is closely related.

17. TACHIGALIA RUSBYI Harms, in Engl. Bot. Jahrb. 33, Beibl. 72:20. 1903. (T.: *Rusby & Squires 127!*).

Trees up to 40 m. high; terminal twigs essentially rounded, delicately canaliculate, puberulent; stipules not seen; petioles conspicuously angular, triangular in cross-section, with a myrmecodomatium about 3 cm. long and 0.9 cm. wide, located below attachment of proximal pair of petiolules, carinate and canaliculate, nodose at petiolule-attachment, 15–25 cm. long, about 0.5 cm. wide in middle, puberulent; petiolules plano-convex, tumescent, up to 1 cm. long, about 0.4 cm. wide in middle, puberulent; leaflets (4–)6- to 7-jugate, stiff-coriaceous, scattered-puberulent, drying purplish-brown above, narrow-oblong to widely oblong, inequilateral, 10–23 cm. long, 3–7 cm. wide, acuminate, cuneate to obtuse, often vaguely auriculate at base on wider side, the costa plane to prominulous above, often densely puberulent, 1–2 mm. wide at base, prominent beneath, the principal secondary veins 8 to 12, prominulous above, subprominent beneath, the ultimate reticulations conspicuous to evanescent above, conspicuous beneath, the margin

¹⁴Whether the bifid stigma represents a worth-while distinguishing character is questionable. It is difficult to observe. I believe that I have observed it in flowers of other species of *Tachigalia*.

thin-callose; inflorescence lax-paniculate, exceeding the leaves, the floral axis and branches very angular, basally and medianly rugose with pedicel scars, the secondary branches up to 22 cm. long, 2–8 mm. wide at base, the racemes up to 7 cm. long; bracteoles densely pubescent, subulate, 4–6 mm. long, acute; receptacle-cup and its short pedicel inequilaterally caliciform, the wall stiff-carnose to coriaceous, 0.3–0.5 mm. thick, the longer side as seen in hemisection 3.5–5 mm. long, the shorter side 2–2.5 mm. long; sepals thin-carnose, often thicker at the base, the two smaller ones less pellucid, minutely pubescent on both sides, the remaining three often minutely punctate, concave, oblong-rotund to narrow-oblong, 3.5–5 mm. wide, obtuse at apex and base, the margin densely ciliolate, the veins evident on the margin in the largest ones; petals pale yellow or sulphur-yellow, petaloid, laxly hirsute within, often minutely rugose, oblong, 5–6 mm. long, 2–3 mm. wide, obtuse to subacute at apex, usually distinctly clawed at base; filaments of stamens subulate, 3 of these thicker in middle, 0.6–0.7 mm. wide, subfalcate to erect, 6–10 mm. long, the other 7 more slender, 0.2–0.5 mm. wide in middle, suberect, scarcely exceeding the thicker filaments in length, all pubescent at base, often only on inner face; stipe of ovary conspicuous, 2–3 mm. long, usually barely exceeding the shorter side of cup, arising abruptly near middle of cup, the ovary oblong, densely pubescent, 3.5–4 mm. long, the style 6–8 mm. long; fruit not seen.

BRITISH GUIANA: Cuyuni River, Akarabice Creek, *Tutin 440* (US); Bartica-Potaro Road, *Tutin 201* (US).

VENEZUELA: Lower Orinoco, Santa Catalina, *Rusby & Squires 127* (MO, NY, US); BOLÍVAR: Río Caroní, Arabayen, Guayana, *Cardona 1654* (NY, US).

BRAZIL: AMAZONAS: São Paulo de Olivença, *Froes 20689* (NY).

Several characters serve to distinguish *T. rusbyi*: the markedly nodose and triangular (in cross-section) petioles, and the small flowers. The petals of the flowers are often rugose and the filaments of the stamens subequal in length. The calyx-cup assumes the form of an inequilateral chalice when viewed in profile together with the pedicel.

Cardona 1654 possesses remarkably narrow leaflets considering their length; its petiole gives evidence of tumescence along its length, as in *T. formicarum* Harms. I have included the immature *Froes 20689* in *T. rusbyi* primarily because of the nodosity of its petioles, the conspicuous ultimate reticulations of the leaflets, the carinate tips of the branches, and in the general habit of the branches of the inflorescence.

In British Guiana *T. rusbyi* is known by the common name "Yawarddan", while in Brazil by "Taxi."

18. *TACHIGALIA pulchra* Dwyer, sp. nov. (T.: *Cardona 1180!*).

Arbores; ramuli terminales dense argenteo-sericei canaliculati torti; stipulae non visae; folia ad 25 cm. longa; petioli minute carinati puberuli angulati, ad 14 cm. longi, circ. 3.5 mm. in medio lati; petioluli marcescentes subtumescetes, circ. 3 mm. longi; foliola 6-jugata tenui-coriacea supra subglabrescentia (praeter costam)

infra minute puberula oblonga, ad 14 cm. longa, ad 3.8 cm. lata, apice acuta (ultime mucronata) basi obtusa, venis secundariis principalibus $10 \pm$ supra planis infra prominulis, marginibus vix revolutis; inflorescentiae paniculatae dense puberulae, rhachide centrale ad 16 cm. longo, ramis paucis divergentibus angulatis gracilibus (circ. 1.5 mm. in medio latis) nodosis (cicatricibus pedicellorum), racemis dense floriferis angusto-pyramidalibus, ad 8 cm. longis, circ. 2 cm. latis, floribus inferioribus mox deciduis; bracteolae dense argenteo-puberulae lato-subulatae, ad 2 mm. longae, acutae mox deciduae; calyx receptaculi parvus oblique cupuliformis, pariete crasso-coriaceo, circ. 1.2 mm. lato extus pubescente intus glabro latere longiore circ. 3 mm. longo, latere brevior circ. 2 mm. longo; sepala 5 tenui-carnosa extus minute lanosa concava oblonga, circ. 4 mm. longa, 2–2.5 mm. lata, apice obtusa marginibus dense ciliolatis; petala 5, tenui-carnosa, corpore basale crassiore intus sparse pubescentia ciliis longis irregularibus, oblonga vel obovato-oblonga, 4.8–5 mm. longa, circ. 3 mm. lata, obtusa vix basi spathulata; stamina 10, filamentis duobus generibus, 3 brevioribus crassioribus, circ. 5 mm. in medio latis, 7 gracili-subulatis, ad 10 mm. longis, 0.4–0.6 mm. latis; stipes ovarii longus, 3–8 mm. longus, circ. 0.7 mm. latus, curvatus, ovario compresso-oblongo vel subtrapeziforme, 1–2 mm. longo, circ. 1.2 mm. lato in toto pubescente, stylo breve, circ. 7 mm. longo; fructus non visus.

VENEZUELA: BOLÍVAR: Alto Rio Paragua, *Cardona 1180* (US).

T. pulchra is recognized readily by its very long-stipitate ovary which is strikingly different in shape from that of any other species of the genus. The new species is obviously related to *T. rusbyi*; in fact, the foliage of the two species is apparently indistinguishable. The vernacular name of *T. pulchra* is "Tachi-yék (Arekuna)."

19. TACHIGALIA TESSMANNII Harms, in Notizbl. Bot. Gart. Berlin 9:967. 1926. (T.: *Tessmann 4753!*).

Trees 15 m. high; twiglets smooth, minutely pubescent, often minutely canaliculate; stipules not seen; leaves up to 35 cm. long; petioles virgate, up to 25 cm. long, about 0.8 mm. wide in middle, with a solitary myrmecodomatium at base which is oblong, about 3 cm. long, about 1 cm. wide; petiolules short; leaflets 6-jugate (the pairs 4–5 cm. apart in the middle of petiole), thin, chartaceous to subcoriaceous, up to 17 cm. long, up to 6.5 cm. wide, subequilateral to obviously inequilateral, apparently long-acuminate, obtuse and often auriculate at base, inequilateral, the costa pubescent above and beneath, more prominent beneath, angular in cross-section, the principal secondary veins $8 \pm$, prominent above, prominent beneath, arcuate-ascending, reticulations more prominent above; inflorescence lax-paniculate, ovate-rotund, shorter than uppermost leaves, about 15 cm. long, about 14 cm. wide, the branches 5–8.5 cm. long, usually sharply ascending, larger ones often suberect, the racemes 5 cm. long, up to 1.5 cm. wide at base; bracteoles subulate, concave, swollen at base, pubescent; buds narrow-obovate, about 6.5 mm. long, scarcely pedicellate; receptacle-cup inequilaterally urceolate,

one side as seen in hemisection 3.5–4 mm. long, the other 2.4–2.6 mm. long, the wall about 0.4 mm. thick, pubescent on outside; sepals 5, 2 of which are smaller and thick, all stiff-coriaceous, usually rugose on outside, ovate-oblong to rotund, 3–3.5 mm. long, 2–2.5 mm. wide, the margins of larger sepals usually subpellucid; petals 5, subequal, 3–4 mm. long, about 2 mm. wide, obovate-oblong, oblong to ovate, usually obtuse, rarely subacute at apex, obtuse to short-spatulate at base, obviously rugose under magnification (especially in middle), glabrous on outside, scattered-hirsute within, the hairs long and subappressed, the principal veins 3, subflabellate-ascending, the margin often irregular; stamens 10, the filaments subequal, subulate, 5–6.5 mm. long, 0.35–0.5 mm. wide at base, densely bearded on one side at base, the hairs divergent-hirsute, the anthers oblong to rotund, about 1 mm. long; stipe of pistil short, about 1.5 mm. long, attached above the middle of the cup on longer side as seen in hemisection, the ovary suberect to subarcuate, densely pubescent, oblong, about 3 mm. long, the style short; fruit not seen.

PERU: LORETO: Puerto Velendez, Pongo de Manseriche, *Tessmann 4753* (MO, photo, NY).

T. tessmannii is readily recognized by its widely spaced leaflets borne on a virgate petiole, its minute flowers with the petals rugose and markedly 3-veined, the stamens spreading radiately at anthesis, and the filaments monomorphic.

20. TACHIGALIA MACROSTACHYA Huber, in Bol. Mus. Goeldi (Para.) 5:387. 1909. (T.: *Ducke 9030!*).

I have elected not to describe this species in a formal manner inasmuch as I have not seen the type material. Huber's description, considerably condensed, is as follows: twiglets and rachis of the inflorescence swollen and myrmecophilous; leaflets, 4- to 5-jugate, ovate-oblong (10–20 × 5.5–6.5 cm.), secondary veins "transversalibus", margin bullate; rachis of inflorescence apparently subglabrous, about 8 mm. thick; receptacle-cup disciferous, about 9 mm. long; stamens 15 (–16–19), the filaments varying considerably in length.

If this plant belongs in *Tachigalia* it is certainly a very distinct species. In no other species of the genus have I observed a rachis of the inflorescence more than 4 mm. thick, a bullate leaf-margin, stamens in excess of 11, and transverse secondary veins. The generalized swelling of the petioles mentioned by Huber is limited to three species of *Tachigalia* examined: *T. formicarum* Harms, one collection of *T. rusbyi* Harms, and in certain collections of *T. cavipes* (Spruce ex Benth.) Macbr.

Assuming that *T. macrostachya* is a valid species, its large and glabrous leaflets and large receptacle-cup suggest a possible relationship with the *T. longiflora* and *T. catingae* complex.

VENEZUELA: AMAZONAS: Rio Mapuera, *Ducke 9030*.

21. *TACHIGALIA PTYCHOPHYSICA* Spruce ex Benth. in Mart. Fl. Bras. 15²:229. 1876. (T.: *Spruce 2644!*).

Twiglets drying deep chocolate-brown, minutely pubescent, vaguely canaliculate; leaves up to 45 cm. long; stipules not seen; petioles virgate, up to 30 cm. long, subplane, delicately canaliculate, puberulent, often swollen about 2 cm. above the point of petiolule-attachment into an oblong myrmecodomatium about 2.5 cm. long, about 0.5 cm. wide; petiolules 4–5 mm. long, 1–2 mm. wide, often twisted; leaflets 6-jugate (pairs 2–3 cm. apart), stiff, coriaceous, drying dull golden-green when pubescence sericeous, the older and less pubescent ones deep purple above and chocolate beneath, equilateral, elliptic, 7.5–16 cm. long, up to 6.5 cm. wide, acuminate, ultimately obtuse, tapering cuneately at base, the costa apparently plane above, prominent beneath, 0.7 mm. wide at base, the prominent secondary veins arising from the lowermost third of the lamina, one large vein on one side, two on the other, the outermost of the two quickly disappearing at margin, all veins more prominent beneath, the reticulations subevanescent to obviously prominent, the margin subrevolute; inflorescence terminal, lax-paniculate, the central floral axis ferruginous, up to 15 cm. long, the principal branches obviously arcuate-ascending; bracteoles widely subulate, scarcely concave, incurved, pubescent, about 7 mm. long, about 0.3 mm. wide at base; buds obliquely clavate; receptacle-cup brittle-coriaceous, the wall about 0.7 mm. thick, inequilaterally urceolate, ribbed and minutely pubescent on outside, furfuraceous within, concave, subcoriaceous, oblong to subrotund, often broader than long, 3.5–6 mm. long, 3–4.2 mm. wide, obtuse at apex, the margin often very thin, ciliolate; petals concave, all subcarinate in middle, appressed-hirsute within, 6–7 mm. long, 4–5 mm. wide, acute to obtuse at apex, subclawed to spatulate at base, the marginal veins often striate; stamens 10(–11), the filaments of 3(–4) shorter and thicker and falcate, 7–8 mm. long when stretched, wider and geniculate above middle, pubescent below middle, the remaining 7 subulate, 7–11 mm. long, pubescent at very base; stipe of pistil attached in middle of lower half of cup, about as long as or longer than shorter side of receptacle-cup, the ovary narrow-oblong, about 4 mm. long, about 1.6 mm. wide, the ovules 10 to 15; fruit not seen.

BRAZIL: AMAZONAS: Panuré, Rio Vaupés, *Spruce 2644* (F, photo and frag., P); without locality, *Spruce 2022* (P, only half of sheet).

This is the simplest of all of the species of *Tachigalia* to recognize. In no other species of the genus are there as few as one or two secondary veins on each side of the lamina.

The great variation in the pubescence of the young and old leaflets seems to substantiate Bailey's observation on *T. paniculata*.¹⁵ The confusing status of the Spruce collection 2022, deposited in Paris, has been discussed following the description of *T. multijuga*. The widely subulate bracteoles of *T. ptychophysca* are not found in any other species of the genus with bracteoles of comparable length.

¹⁵Bailey, I. W. Bot. Gaz. 75:27–41. 1922.

22. *TACHIGALIA VERSICOLOR* Standley & Williams, in *Ceiba* 3:27. 1952. (T.: *Allen 5594!*).

Trees up to 36 m.; terminal twiglets almost smooth, delicately canaliculate, densely pubescent; stipules not seen; leaves up to 50 m. long; petioles subrotund in cross-section, delicately ridged, up to 32 cm. long, about 3.5 mm. wide in middle, densely puberulent; petiolules puberulent, 3–4 mm. long; leaflets 7-jugate, the members of each pair usually very unequal, thin-coriaceous, subglabrous above (except costa), puberulent below, the hairs usually scattered, oblong, up to 20 cm. long, up to 7 cm. wide, subacuminate and ultimately obtuse above, inequilaterally cordate at base, the costa slender and prominulous above, the secondary veins $10 \pm$ in larger leaflets, slender and subplane above, prominent beneath, arcuate and not sharply ascending, the ultimate reticulations subevanescent above, evident beneath, the margin slender-callose; inflorescence lax-paniculate, about 40 cm. long, subcorymboid (in pressed condition), the branches upright-whorled, 1–3 cm. apart, gracefully arcuate-ascending, up to 20 cm. long, the central rachis above uppermost branches 13 cm. long, about 0.3 mm. wide at base; bracteoles not seen; flower-buds inequilaterally obpyriform and about 9 mm. long at maturity, pinkish-lavender in vivo when unexpanded; receptacle-cup widely and inequilaterally urceolate, the longer side as seen in hemisection 4–5 mm. long, the shorter side 2–3 mm. long; the wall coriaceous, about 1 mm. thick; sepals 5, thick-carnose (2 much reduced and very carnose), pubescent on both sides, ovate-oblong to oblong-rotund, 5–7 mm. long, 3–5 mm. wide, obtuse at apex, the margin ciliolate with minute glandular excrescences interspersed; petals 5, subcarnose, obviously carnose at base, subappressed-hirsute within medianly, glabrous on outside, obovate to widely obovate, 8–8.5 mm. long, 4 mm. wide, obtuse, rarely acuminate, usually deeply lobed, obviously clawed at base, the veins substriate; stamens 10, the filaments pubescent at base (except one entirely glabrous) on inner side, 6 or 7 filaments more slender at base, 0.6–0.7 mm. wide, up to 11 mm. long, the remainder usually rectangular in cross-section at base, up to 7 mm. long, the anthers glabrous, up to 2.8 mm. long; stipe of ovary thick, about as wide proximally as distally, about 3 mm. long, the ovary rectangular, 5 mm. long, 2.5 mm. wide, entirely pubescent, the hairs partially disposed in obvious longitudinal rows, the ovules about 15; fruit not seen.

COSTA RICA: PUNTARENAS: upper Río Piedras Blancas, vicinity Río Esquinas, *Allen 5594* (MO).

T. versicolor, the only extra-South American species of *Tachigalia*, is readily distinguished by the following characters: the members of the pairs of leaflets are strikingly different in size; the receptacle-cup is widely and inequilaterally urceolate; one filament of the stamens is entirely glabrous; the anthers are very large; and the ovary has its hairs disposed in longitudinal rows.

I am certain from numerous dissections of tachigalias that the striate pubescence of the ovary is not found in any other species of the genus. Only in the flowers of one collection of *T. pubiflora*, Persaud 24, did I observe another entirely glabrous solitary filament of the stamen.

In the original description of *T. versicolor* the fruit is described as: ". . . strongly compressed, narrow-oblong, 14–15 cm. long, round and apiculate at apex, the seed strongly compressed, cuneate-obovate, 3.3 cm. long, 2 cm. wide, narrowly marginate." Unfortunately I did not see the fruit.

EXCLUDED SPECIES

I have omitted *Tachigalia grandiflora* Huber (Bol. Mus. Goeldi [Para.] 5:388. 1909), based on a sterile collection of Ducke (8965) made at the Mapuera River, Brazil, below the "cataracts do Pataua." Unfortunately, I have not seen the sterile (?) type material.

In studying a collection of Riedel (804) I discovered that it is not *Tachigalia* but *Dicymbe* Spr. ex Benth. Therefore:

DICYMBE psilophylla (Harms) Dwyer, comb. nov.

Tachigalia psilophylla Harms, Bot. Gart. Berlin Notizbl. 6:305. 1915.

BRAZIL: BAHIA: without specific locality, Bondar s. n. (F); STATE?: Esperanaca, Riedel 804 (F, photo and frag. of type, collection of *Tachigalia psilophylla*).

The glabrous to subglabrous filaments of the stamens (fide Harms), the large reniform stipules, and the very long cigar-shaped fruits leave no doubt that this is a species of *Dicymbe*.

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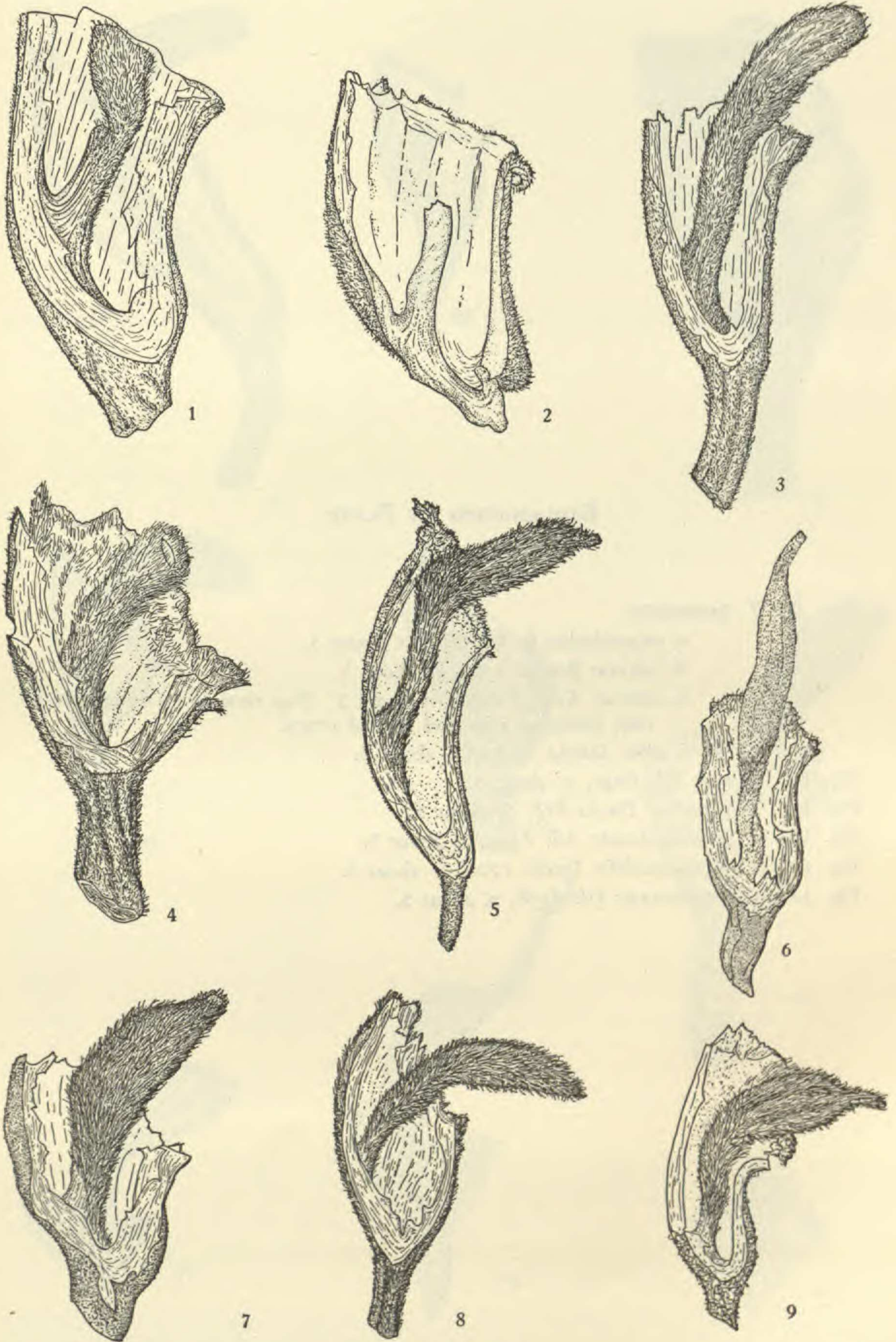
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EXPLANATION OF PLATE

PLATE 9

Hemisections (except for *T. paniculata* var. *comosa*) of the receptacle-cups of species of *Tachigalia* showing the length and location of the stipe of the pistil. Occasionally the ovary and the style have been included. The drawings are arranged according to the sequence of the species in the paper; *T. macrostachya* alone has not been included.

- Fig. 1. *T. longiflora*: Ducke 24291, × about 5.
- Fig. 2. *T. catinae*: Ducke 35421, × about 5.
- Fig. 3. *T. multijuga*: Spruce 2022, × about 5.
- Fig. 4. *T. rigida*: Ducke 35423, × about 5.
- Fig. 5. *T. bracteolata*: Martin s. n., × about 5.
- Fig. 6. *T. cavipes*: Krukoff 6816, × about 5.
- Fig. 7. *T. venusta*: Ducke 1989, × about 5.
- Fig. 8. *T. pubiflora*: Schomburgk 43 (33?), × about 5.
- Fig. 9. *T. paniculata*: LePrieur 355, × about 5.



DWYER—TROPICAL AMERICAN TACHIGALIAS

EXPLANATION OF PLATE

PLATE 10

Fig. 9. *T. paniculata*:

a. angustifolia: B. W. 5615, \times about 5.

β . sulcata: Benoist 1574, \times about 5.

γ . comosa: Krukoff 8854, \times about 5. Top view of entire receptacle-cup, including stipe and part of ovary.

δ . alba: Ducke 17075, \times about 5.

Fig. 10. *T. ulei*: Ule 6042, \times about 5.

Fig. 11. *T. plumbea*: Ducke 818, \times about 5.

Fig. 12. *T. grandistipulata*: Ule 8399, \times about 5.

Fig. 13. *T. myrmecophila*: Ducke 1706, \times about 5.

Fig. 14. *T. formicarum*: Ule 6538, \times about 5.



EXPLANATION OF PLATE

PLATE 11

- Fig. 15. *T. polyphylla*: Krukoff 7233, × about 5.
Fig. 16. *T. agyrophylla*: Ducke 936, × about 5.
Fig. 17. *T. rusbyi*: Rusby & Squires 127, × about 5.
Fig. 18. *T. pulchra*: Cardona 1180, × about 5.
Fig. 19. *T. tessmannii*: Tessmann 4753, × about 5.
Fig. 21. *T. ptychophysca*: Spruce 2644, × about 5.
Fig. 22. *T. versicolor*: Allen 5594, × about 5.